

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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A New Continuous Rolling Mill.

Continuous rolling mills have heretofore either been constructed with rolls in pairs, arranged alternately in horizontal and vertical positions, so as to compress the iron in opposite directions, or with all the rolls in a horizontal position, the iron being conducted from one pair to another by the use of twisted guides. Both of these methods have objectionable features which the mill illustrated is designed to remove. In this mill, which is the invention of W. R. Jenkins, of Bellefonte, Pa., all the rolls are arranged in the same position, the horizontal, of course, being preferred. Its principal novelty consists in the peculiar shape of the rolls, a front view of which is shown at Fig. 1. The top roll, it will be observed, is of a general convex form, the bottom roll of a general concave form, the former having an angular collar or projection, the sides or faces, $g^1 g^2$, of which are beveled at an angle of about 45 degrees. Into these faces are turned the grooves $g^3 g^4$. As shown in the drawing, one of these is an oval and the other a diamond or gothic shape. A large angular groove is turned into the bottom roll to receive and fit the angular collar of

not shown in the drawing. Fig. 4 is the form of guide used when the roll F, Fig. 1, is placed in the bottom, and is the reverse of Fig. 3 in general design. Fig. 2 is a longitudinal section through a portion of the mill containing two pairs of rolls, and shows the manner of supporting the guides, which is done by means of the rest-bar k , supported in the recesses k^1 of the housings. The guides are provided with lugs, l , which rest against the bar k . The receiving end of the guides rests on the bottom roll in the usual manner.

In a mill of this kind as many pairs of rolls can be used as may be necessary to effect the desired reduction of the iron, the rolls being speeded so as to take up the elongation of the iron from one pair to the next. This system can be adapted to making flats, rounds or squares, but is particularly advantageous in the manufacture of wire rods where rods of great length are desirable, as it is only governed by the capacity for heating the billet. The output of a mill of this kind in a given time must necessarily exceed that of a train worked by hand. Of course as many pairs of rolls may be used as is necessary to suit any particular requirements, and the same system of roll turning

IMPROVED ENGINE GOVERNOR
of his invention. With the object of eliminating the friction of the valve stem in its stuffing box, and avoiding the inconvenience arising from the variable pressure of steam on the stem, he incloses the mechanism of an ordinary ball governor in a steam chamber, in which it revolved. He uses the ball arm as valve, pivoted on a movable valve chamber.

At a recent meeting of the Philadelphia Academy of Sciences, Prof. G. A. Koenig exhibited his invention, the
CHROMOMETER,
an instrument designed for the purpose of making delicate determinations of the presence of certain metals in ores. It is based upon the optical fact that complementary colors extinguish each other if mingled in proper proportions; for instance, if to a green solution a red solution be added, the liquid, if the proper conditions be complied with, will become colorless. Prof. Koenig has applied this principle to the colors which certain metals, as iron, manganese, copper, &c., produce when fused with borax, which is the only chemical used in this method of analysis. He prepares glasses or beads con-

and allowed to drop, which he readily does when dissatisfied with his quarters, but before falling he glues an end of cord to the finger, and then lets himself down easily by gradually spinning it out and hanging by it as it lengthens. The instrument maker catches this cord across his fork, and by turning attaches it to one side; then he goes on turning the fork and advancing it, so that, as the spider continues paying out his cable, a series of obliquely crossing threads are wound upon the fork, which when charged is carefully laid in a box or drawer for use. The elasticity of the iron wire keeps the webs sufficiently stretched, and they are applied to the "stop" by simply laying the fork over it in such wise that one of the stretched webs shall fall upon the mark made on its face. When thus in position a drop of varnish or glue, made by dissolving shellac in alcohol, is let fall upon each side; the spirit rapidly evaporates and the web is fixed.

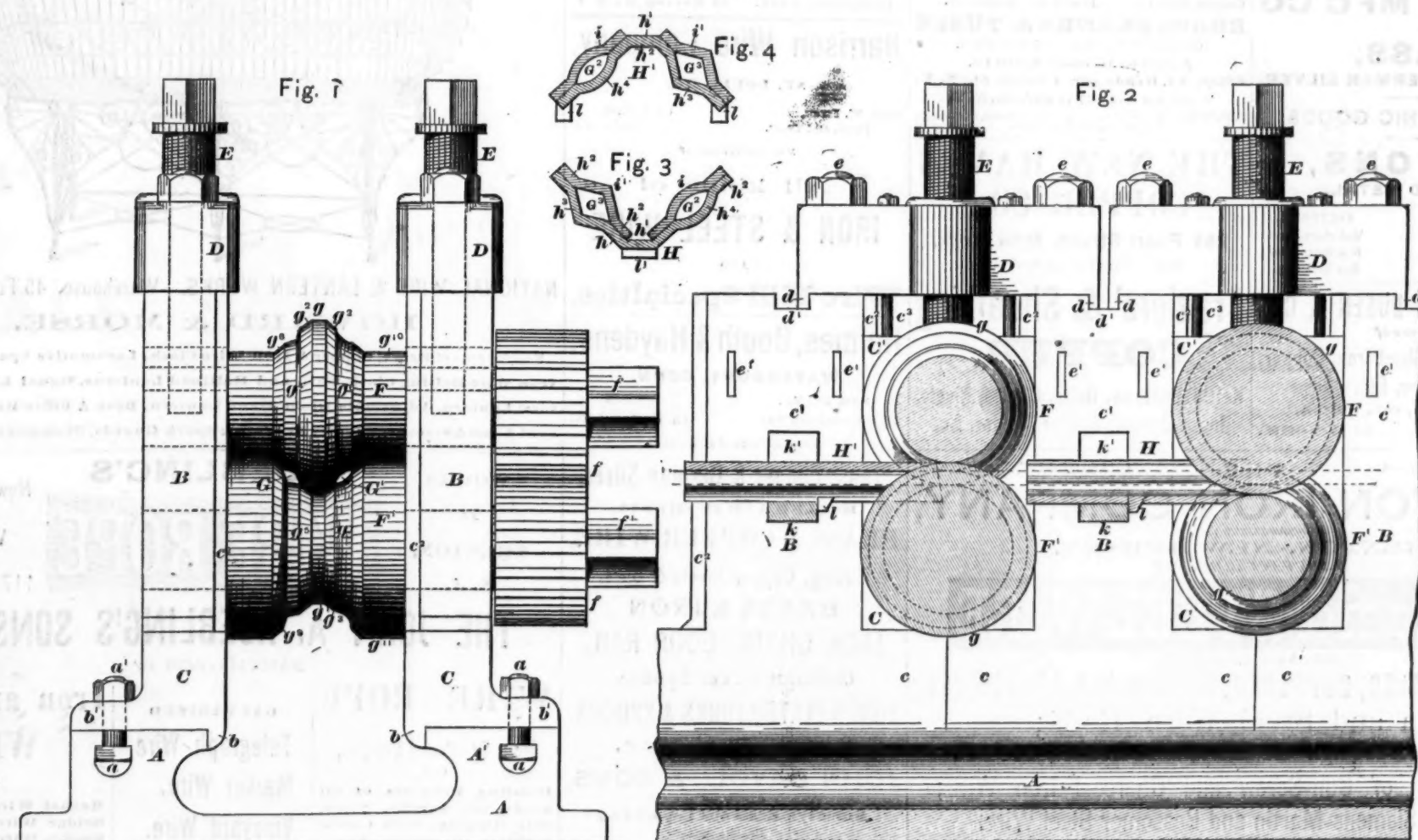
About eight years ago the city authorities of London offered a prize for the invention of an economical method of

REMOVING SNOW FROM THE STREETS.

Seventeen schemes were submitted. The

The Chinese in California.

Notwithstanding the refusal of President Hayes to approve the anti-Chinese bill, the Chinese residents in California are likely to find their stay in this country neither pleasant nor profitable, unless they can remove to localities in which they will be treated with more consideration. As showing the spirit which actuates the people of the Pacific Coast, we quote the following sections from the proposed new Constitution of California, as approved by the Convention: Section 1. The Legislature shall prescribe necessary regulations for the protection of the State, and the counties, cities and towns thereof, from the burdens and evils arising from the presence of aliens who are or who may become vagrants, paupers, mendicants, criminals, or invalids afflicted with contagious or infectious diseases, and aliens otherwise dangerous or detrimental to the well-being or peace of the State, and to impose conditions upon which such persons may reside in the State, and to provide the means and mode of their removal from the State upon failure or refusal to comply with



JENKINS'S NEW CONTINUOUS ROLLING MILL.

the top roll, the sides or faces of this groove being inclined at the same angle as the sides of the top roll. Into these sides are turned the grooves $g^1 g^2$, to match the grooves $g^3 g^4$ in the top roll, thus forming two complete passes, the longer axis of which are inclined upward and outward at about an angle of 45 degrees. Supposing this to be the first pair of a train, the second pair would be arranged with the rolls reversed, the roll F would be the bottom, and F' the top roll. Thus the bevel faces would incline downward and outward at the same angle as the preceding pair, so that the longer axis of the grooves or passes G and G' in one pair, would be at right angles to the longer axis of the grooves in the preceding or following pair, the tendency of the iron to fin being counteracted, without twisting or turning the iron or reversing the position of the rolls. Another advantage gained by this form of roll is that the practical difficulty encountered in adjusting the roll endwise is obviated. The rolls are placed loosely in their bearings, and all adjustment, both horizontally and vertically, is accomplished by means of the top screws E. As it is evident that as soon as the iron enters the groove G' the rolls will be forced apart in the direction of the bevel on the opposite face, there is no end thrust whatever on the bearings.

In Fig. 1, A represents the bed-plate, B the housing, C the base of the housing and D the cap; f and f' are wabblers or couplers. Figs. 3 and 4 are cross sections, showing the form of guides used in this mill—Fig. 3 being the form used when the roll F, Fig. 1, is placed in the bottom. This guide has a body, H, having the same form in section as the intended portion of the roll. It is fitted with lids or caps i and i' , forming grooves or passages G' and G', corresponding to the passages G and G' in the rolls. These lids are bolted to the body of the guides by bolts

can be adapted to make flats as well as guide iron. There is a mill in operation consisting of eight pairs of rolls, which reduces $1\frac{1}{2}$ -inch billets to half-inch square. The iron is finished in rolls separate from the continuous train. We are assured that the practicability of this invention has been demonstrated, and that it gives promise of proving of value to the iron and steel interests of the country.

Scientific and Technical Notes.

Mr. B. Harras, of Boehlen, Germany, gives the following recipe for making

IMITATION IVORY.

Dissolve 100 parts of glue in 1000 parts of water, and 50 parts of alum in the same quantity of water, and mix 50 parts of cellulose in 3500 parts of water; 75 parts of the solution of glue, 200 parts of the paste of cellulose, 250 parts of finely ground gypsum, 200 parts of alum solution and 100 parts water are thoroughly mixed, and the mass is then filled into metal forms carefully coated with lard. It is covered with linen, the superfluous water is drained off, and then it is allowed to solidify. As soon as the article is taken out of the mold it is washed with hot water, dried and soaked with a hot mixture of equal parts of wax and stearine. After cooling it is brushed until it has the proper luster.

According to *Dingler's Poly. Journal*, A. Mueller, of Cologne, Germany, has invented a novel

ROTATING STEAM ENGINE.

He connects a number of turbines in a common casing, their diameters increasing gradually. The steam enters the smallest and escapes from the largest. The machine is said to be very economical.

Prof. D'Annia describes, in the *Journal of the Franklin Institute*, an

taining known quantities of a metal in one hundred parts, and observes how thick a glass of the complementary color must be to produce extinction. To accomplish this the instrument is furnished with a glass wedge of a green or red color, cut at an angle of about one degree. By moving this wedge before the glass bead, with the help of a suitable rack movement, a scale moves at the same time, and when the point of extinction of color is arrived at, the reading of the scale refers to a table showing the percentage of metal contained in the examined substance. By this method of analysis a correct determination of manganese in an iron ore can be made in 15 minutes, or a copper estimation in 30 minutes.

The Philadelphia and Reading Coal and Iron Company are making some very interesting experiments with

ELECTRIC LIGHTS FOR SHIPS.

The parabola reflector is used for head-light purposes, and, necessarily, the light must be kept directly opposite the focus of the reflector. But as the lower carbon burns away, in the course of time the light would drop lower than the focus of the reflector, and thus spoil the effect. This prevents the use of electricity for head-light purposes at present. The company, however, are arranging for an automatic instrument that will force the lower carbon up as it burns, and thus keep it in the center of the reflector. By this means the company hope to be soon able to use the light at sea.

Prof. W. Mattioli Williams, in a lecture before the London Society of Arts, gives a description of the method of procuring the fine

HAIR LINES OR WEBS FOR TELESCOPES.

The webs are secured for use and storage by making a fork of iron wire, 4 or 5 inches long and $1\frac{1}{2}$ to 2 inches between the bifurcations. The spider is held in the left hand

successful apparatus was at once erected and has been in operation every year since. It consists simply of an inclined plate of iron, fixed below a manhole leading to the main sewer. Under this plate are ranged gas burners. The snow carted from the adjoining thoroughfares is shovelled down the manhole grating, falls on the heated plate, is reduced to water and passes away down the sewer. The consumption of gas is very moderate, and the cost is said to be much less than that incurred by carting away the snow on the old system. The apparatus, says the *Engineer*, has proved extremely successful, and the invention deserves to be widely adopted.

On Feb. 13, the headings between Shafts 8 and 9, main tunnel of the Baltimore City Water Works, met, and a few days after, the Chief Engineer, R. K. Martin, in company with two eminent civil engineers from Washington, inspected the work. They descended Shaft No. 9, and passed through under ground to No. 8. On looking over the center line by means of plummet lamps suspended from center piers on either side of the point of junction, they acknowledged that the meeting of lines was accurately correct. They highly complimented the engineers in charge for their engineering success. The drift was some 2200 feet long, and the depths of the shafts 200 and 140 feet, respectively. The resident engineers are W. T. Manning, of No. 9, and Charles T. Manning, of No. 8.

The quantity of iron made in Belgium in the first half of 1878 is officially computed at 196,500 tons, as compared with 183,000 tons in the corresponding period of 1877. The number of workmen engaged in the first half of 1878 was 12,700, as compared 11,700 in the first half of 1877.

such conditions; provided, that nothing contained in the foregoing shall be construed to impair or limit the power of the Legislature to pass such police laws or other regulations as it may deem necessary.

Section 2. No corporation now existing or hereafter formed under the laws of this State shall, after the adoption of this Constitution, employ, directly or indirectly, in any capacity, any Chinese or Mongolian. The Legislature shall pass such laws as may be necessary to enforce this provision.

Section 3. No Chinese shall be employed on any State, county, municipal or other public work, except in punishment for crimes.

Section 6. The presence of foreigners ineligible to become citizens of the United States is declared herein to be dangerous to the well-being of the State, and the Legislature shall discourage their immigration by all the means within its power. Asiatic coolieism, being a form of human slavery, is forever prohibited in this State, and all contracts for coolie labor are null and void. All companies or corporations, whether formed in this country or any foreign country, for the importation of such labor, shall be subject to such penalties as the Legislature may prescribe. The Legislature shall delegate all necessary power to the incorporated cities and towns of this State, for the removal of Chinese without the limits of such cities and towns, or their location within prescribed portions of those limits, and it shall also provide the necessary legislation to prohibit the introduction into this State of Chinese after the adoption of this constitution. This section shall be enforced by appropriate legislation.

The Knights of Labor in Philadelphia are on the point of invoking the law against those proprietors of mills who require boys and girls to work over the regular hours.

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THE ANSONIA
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 SEE PAGE 9.

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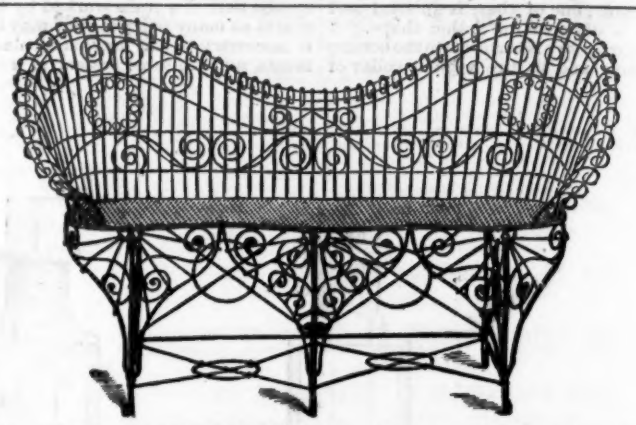
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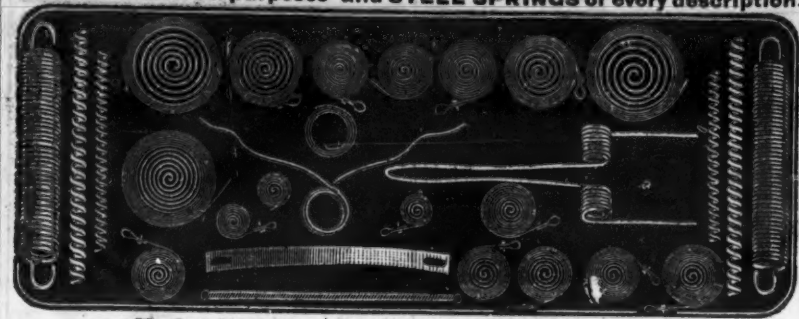
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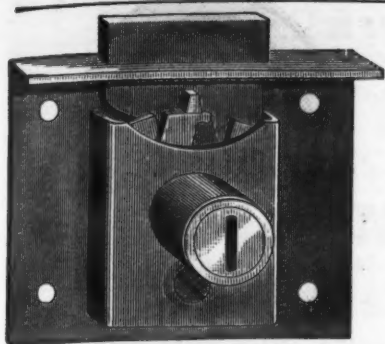
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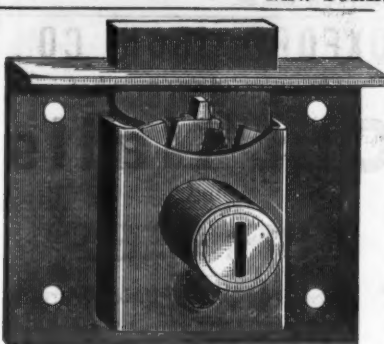
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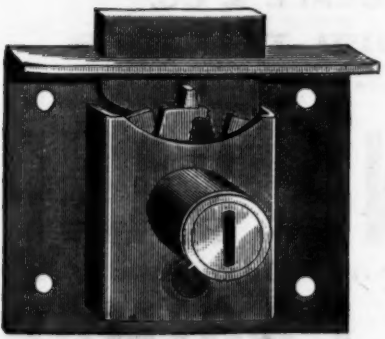
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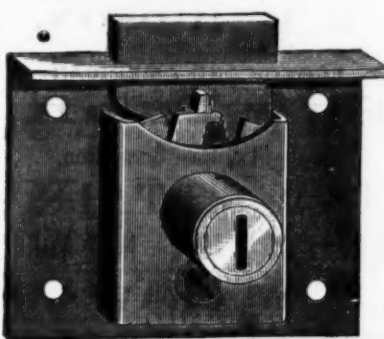
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Nov. 12,
Dec. 17,
1878.

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The Iron Ores of the Lake Superior Region.*

The missionaries and explorers who visited the south shore of Lake Superior in the beginning of the seventeenth century, were not long in discovering the existence of copper; but they and many generations of their successors failed to note the immense deposits of iron ore of that favored region. It was not until September, 1844, that the United States surveyors, observing the deflection of the needle of their solar compass, and seeking the cause, found the first outcrops of magnetic ore. According to our authority, Prof. Charles D. Lawton (whose contribution to the history of the region we noticed in a recent review of the report of the Commissioners of Statistics of Michigan), the Jackson Mining Company made the first location in the following year, 1845, but it was not until 1846 that the first ore was taken out. Two years later, in 1848, the first iron was made in a forge built on the Carp River. After making its first shipment of 5000 tons in 1856, the company experienced much disappointment and embarrassment, until the beginning of the war created a great demand for iron. Several attempts were made in the earlier days of the district to make iron in bloomeries, both by the Jackson and the Marquette (now the Cleveland) companies, but they invariably proved failures. The first furnace for smelting the ores was the Pioneer, erected in 1850 by the Pioneer Iron Company, subsequently merged into the Iron Cliffs Company. The district, under the impetus of a constantly increasing demand, experienced a wonderfully rapid development, the climax of which was reached in 1873. Since that year the established mining companies have continued producing steadily, until previous figures have been almost reached. The early development of the iron industry was very much aided by the construction of the Sault Ste Marie Ship Canal, in the years 1853 to 1855, which avoided the Sainte Marie Rapids in the passage between Lakes Superior and Huron, and by the building of the Iron Mountain Railroad from the Jackson and Cleveland mines to the lake, in the years 1855 to 1857. Later, in 1863, the railroad from Negaunee to Escanaba was begun, and in 1872 the Chicago and Northwestern was extended to Escanaba, thus giving the region railroad connection with Chicago.

The rocks of the Upper Peninsula are composed chiefly of the oldest stratified deposits known to geologists—the Laurentian, Huronian and Silurian. The former are principally granites and gneisses, which are probably, in many cases, unconformably covered by the members of the Huronian series. The latter are composed of quartzites, limestones, jaspers, hornblende rocks, diorites, novaculites, argillites, &c. Major T. B. Brooks has divided the lower Huronian strata—the home of the iron deposits of Michigan—into nineteen members, of which No. XIII is the most important, as containing the hard ores of the State, generally in lenticular masses, which show all the known varieties of the magnetic and red oxides. No. XII, which usually forms the foot wall in the mines, is a red-banded jasper, while No. XIV is a quartzite or quartz conglomerate.

The oldest mine of the region is, as already noted, that of the Jackson Iron Company, who, from remarkably irregular beds, have shipped, in the period from 1856 to 1877, an aggregate of 1,725,533 tons of ore, the highest figure for one single year being that of 1871, with 132,297 tons. The Cleveland Iron Company shares with the former the honor of being the first developed mine of the district, having been incorporated in 1853, and having mined 3000 tons in 1855. The openings on ore are numerous and the beds irregular, the ore being a fine quality of rich specular. Near its No. 9 pit, the company is said to have had one of the largest bodies of ore in the country. The total shipments from the time of discovery to the year 1877, inclusive, were 1,685,392 tons, the largest output for one year being 151,724 tons in 1872, which was equaled, within a few tons, in 1877. The actual working of the New York Mine, the property of S. J. Tilden and W. L. Wetmore, began in 1864 with shipments of 8000 tons. For several years it appeared as if there were two independent veins of ore, but at a depth of 100 feet these united in one deposit, which yields a rich specular ore, of which 786,984 tons have been shipped in all, the highest yearly output having been reached in 1870, when 94,809 tons were sold. Since then it has varied, the lowest figure being 55,581 tons in 1877. Another of the old and busy companies of the district is the Lake Superior Iron Company, which began operations in the summer of 1857. The main workings are located on beds the extreme irregularity of which is caused by a complication of folds and faults. They yield a specular slate and granular specular, which, when properly selected, is of the best quality; 1,890,159 tons has been the total product of their mines, the present (1877) output being 127,349 tons. The Barnum yields specular ore from a 13-foot vein, which is beginning to present complicated features. The output has been quite regular since 1869 at about 40,000 tons. A hard and soft hematite, averaging well in iron if properly assorted, and sufficiently low in phosphorus for Bessemer purposes, is taken at the Lake Angeline mine from a deposit varying greatly in thickness. Since 1864, the output has been 445,375 tons. The Salisbury mine works by open pit, a lens having an average width of 35 feet. The ore, a superior quality of soft hematite, was found by Mr. Wright, Commissioner of Statistics, to contain as much as 68.20 per cent. of metallic iron. The mine is of more recent origin, having furnished since 1872, 81,247 tons, of which 37,868 tons were mined in 1877.

A number of mines, some of them of importance, may be grouped as belonging to the Saginaw Range. Foremost among them are the developments of the Saginaw Mining Co., who from four shafts sunk on the lay of the vein, the thickness of which fluctuates considerably, extract a hard spec-

ular ore, which varies greatly in texture and structure. If it were not for the expense of handling considerable bodies of water, the cost of extraction would be very low. The mine shipments have aggregated 254,227 tons from 1872 to 1877, inclusive. Soft hematite to the extent of 110,566 tons was taken out of the New England mine up to 1873, when operations were suspended. A more promising working is that of the Section 19 mine of the Lake Superior Mining Company, and the Winthrop Mine, an open pit yielding soft hematite low in phosphorus from a 40-foot vein, the aggregate shipments being 112,832 tons in seven years. Of the other mines, the Foster is worth mentioning, it having produced 100,012 tons in eight years from a vein of 15 feet thickness.

Soft hematites and limonites of good quality, exceptionally low in phosphorus, and occasionally rich in manganese, are mined in the vicinity of Negaunee. The larger mines are the McComber, the Rolling Mill and the New York Hematite, besides which there are the Negaunee, the Himrod, the Bessemer, the Allen and the Cambria mines. The formation at the McComber mine is very irregular, and it seems that the nature of the ore also varies considerably, there being numerous and often considerable pockets of highly manganeseiferous ore, very low in phosphorus, silica or alumina. An actual trial made at the Munising Furnace proved how well the ore is adapted to the manufacture of spiegel. The company have shipped in all 134,142 tons in eight years. The Rolling Mill mine has the advantage of being very conveniently located for mining and for the transportation of ore, which is a soft hematite and brown ore, carrying no manganese. Since 1871, 158,452 tons have been shipped.

Among the mines which were early sufferers from the effects of the panic of 1873 were those of the Cascade Range, about four miles south of Negaunee, notwithstanding the fact that the deposits seemed inexhaustible and favorably located, and that the ores were of high quality. The noted mines of the range are the Palmer, which in one year previous to the disasters of 1873 reached a production of 41,000 tons of specular ore, the Pittsburgh and Lake Superior, the Carr, the Gibben and the Home.

A mine which has been for a number of years a fair producer of ore, is the Humboldt, formerly the Washington mine. A shaft recently sunk happened to come very near the junction of two lenses of ore—the one magnetic and the other specular—a common phenomenon in the district. Contiguous to the Humboldt is the Edwards, also an old mine. It is the only instance in the region of a mine which has been worked under ground from the beginning. Although at present showing but little ore, the occurrence of the deposits is such that prospecting may at any time reveal new lenses. The mine has shipped in all since 1866, 200,000 tons, half the amount of the output of its neighbor, the Humboldt. The mines of the Champion Company yield magnetite and specular ores, the latter predominating, taken from underground workings. The product of the mine is divided into three classes, the first-class ore being that in which no rock or iron pyrites can be seen. It averages 67 per cent. of metallic iron, while the second-class is only 2 per cent. less. The output had reached 73,000 tons in 1873, but fell to 40,000 in 1874. Since that year a gradual recovery has taken place, and the production in 1877 was 70,883. The Republic mine is located 37 miles west of Marquette. The structure of the deposit is complicated, so that the workings are divided into 14 pits. No. 6 contains a 50-foot vein of nearly pure specular ore, while No. 4 carries, besides a vein of specular, a body of very pure magnetic ore as wide as 40 feet, which gradually narrows in No. 3. In No. 2 is a very interesting deposit of marlite—that is, specular ore crystallized after magnetite. It would be impossible to distinguish it from magnetite by its texture; it is but slightly magnetic, and, instead of yielding a black powder, it gives a brownish red streak. The engines of the mine are operated with compressed air instead of steam, the compressors being worked by two Swain turbines, located on the Michigamme River at a distance of 5000 feet from the engine-house. Since the second year of its existence, 1873, the Republic mine has never shipped less than 100,000 tons per annum, the figures reaching 165,836 in 1877. Another mine, working on the same vein, though not a productive one of late years, is the Klonan.

In the Michigamme Range we have first the Michigamme workings, the appointments of which are superior. They produce magnetite high in iron and low in phosphorus, principally from two openings. The ore of the Spurr Mine, taken from a deposit in places 50 feet thick, is well adapted for foundry or mill-iron purposes. Adjoining it is the Steward, which ships but little ore. An isolated mine, which Mr. Wright has found to be better than its fame, is the Silas C. Smith, which yields ore closely resembling the soft specular of the Menominee Range. The same mine produces a peculiar variety of hematite, resembling a bronze-colored putty.

We come next to the mines of the Menominee Range, made accessible recently by the Menominee River Railway. The Emmett Mine has an ore belt consisting of two different varieties—a bluish-colored soft specular on the hanging-wall side of the vein and soft brown ore on the foot-wall side, the former being well adapted to the requirements of steel makers, while the latter will only make foundry iron, a sample showing it to run as high as 0.129 in phosphorus. Adjoining the Emmett is the older Breen mine, which produces soft blue specular from a vein which is rather irregular. Quite a recent mine is the Vulcan, six miles from Waukegan. The vein, which is worked by open cut and a short tunnel, has a lenticular shape and yields ore of good quality adapted for steel purposes. The company operating it, the Menominee Mining Company, have also taken in hand the Norway Mine, of which much is expected for the future. The prospects of the Cyclops, another of the company's mines, are said to be bright, the analyses made hitherto showing low phosphorus and a good average in iron. The deposits of the Lake Superior district

* Condensed from the report of Charles E. Wright, Commissioner of Mineral Statistics of Michigan, 1879.

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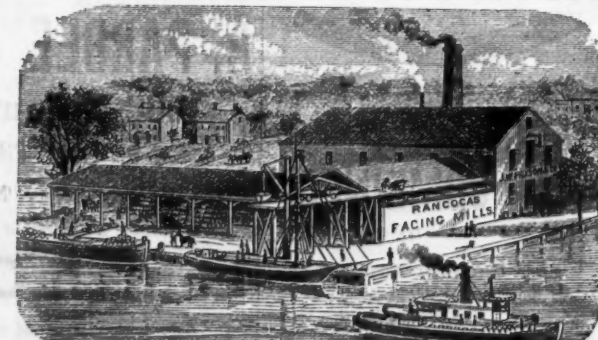
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are subject to many variations, due to folds,
faults, slips and "horses." These make the
search for, and the mining of, iron ore a
matter depending much upon good for-
tune, and it is hoped, in the interest of the
region, that a careful record will be kept of
developments made, and that the deposits
will be closely and carefully watched. After
careful, conscientious study, a competent
geologist, like Mr. Wright, will often be in
a position to aid and direct both explora-
tions in new districts and dead work in old
mines.

Iron and Steel in Shipbuilding.

The London Times has the following
valuable article on iron and steel for ship-
building:

In an interesting paper which he read in
May, 1870, before the Iron and Steel Insti-
tute, Mr. Charles Mark Palmer, M. P., the emi-
nent shipbuilder, observed: "As iron is far
superior to wood, it must be considered the
best material for shipbuilding till the manu-
facture of steel is perfected and that article
is produced at a cheap rate. In the mean-
time, steel can only be used with advantage
in exceptional cases. It will be for the
members of the Institute to so perfect the
use of steel that, while the price shall be
comparatively low, the quality shall be uni-
form. Then the extra strength will doubt-
less cause it to be generally adopted, both
in vessels for the merchant service and in
ships of war."

The experience of the last two years has
done much to solve this problem. At the
close of 1877, for the first time, the rules of
Lloyd's Registry for iron ships recognized
the greater tenacity of steel. Mr. B. Mar-
toll, chief surveyor of Lloyd's, has reported
that "mild steel can be manufactured, either
by the Bessemer or by the Siemens
process, possessing qualities of ductility in
connection with tensile strength and general
uniformity, which render it much superior to
the iron in ordinary use." Mr. W. Boyd, of
Newcastle-upon-Tyne, has found, after an
elaborate series of tests and experiments,
that in steel plates "absolute practical uni-
formity can be relied on, extending over a
large quantity of material." Abundance of
concurrent testimony points to the same con-
clusion. Hence, we may regard the cheap-
ness, uniformity and tensile strength of
steel plates as placed beyond controversy.

The question thereupon arises, To what
extent, and within what period of time, is
steel likely to take the place of iron for ship-
building purposes? It must be admitted that
up to the present time steel has not made its
way very rapidly in the favor of ship-
owners. But this was, in its day, equally
true of iron. The first iron ship that went
to sea—the Aaron Manley, built by the
Horsley Company, near Birmingham, and
put together in London—made her first
passage, between London and Paris, in the
year 1820. And yet at the end of thirty
years from this event, in 1850, the gross
tonnage of British steam vessels,
amounting to 275,190 tons, was made up of
only 57,361 tons of iron as against 217,829
tons of wood. Ten years later still, and the
two materials had entirely changed places.
The gross total tonnage of British steam
vessels in 1860, amounting to 636,417 tons,
was made up of 535,596 tons of iron and
only 100,821 tons of wood. In the eight
succeeding years the difference was still
more remarkable. The total gross tonnage
of British steam vessels had increased in
1868 to 1,341,106 tons, composed of 1,218,824
tons of iron and only 122,282 tons of wood.
It is, perhaps, not too much to say that the
year 1878 marks the same point of departure
in reference to the use of steel, that the year
1860 did as regards the use of iron for the
purposes of shipbuilding. Although steel
has been used off and on for many years,
it has not been employed on anything like
a commercial scale until quite recently.
Up to the year 1870, indeed, only 27,000
tons of shipbuilding, embracing both screw
and paddle steamers, had been constructed
of steel. This total included a sailing ship
of 1200 tons register, which has now been
employed as a regular trader for fifteen
years, and has in that time given the utmost
satisfaction. But until very recently steel
was deemed of advantage only in con-
structing steamers of light draft, and even
now, when the cost of steel plates has been
largely reduced, and the position of steel is
recognized both by the Admiralty and by
Lloyd's—the latter by allowing a general
reduction of 20 per cent. in the thickness
of the plating, framing, &c.—many ship-
builders hold that the gain in respect of greater car-
rying power which vessels built of steel
plates possess, will be confined to cases
where heavy cargoes are regularly obtainable,
and that where, as in the majority of
cases, the holds are full before the vessel
has attained her maximum draft, there is
clearly no advantage in preferring steel to
iron. Such a view, of course, can only be
founded on the problematical assumption
that the price of steel for shipbuilding pur-
poses will continue to compare as unfavora-
bly with that of iron as hitherto. If the
two were brought pretty nearly on all fours,
as they are much more likely to be, the ad-
vantages of steel would be obvious. In most
of the steel vessels constructed up to the
present time, the difference of weight has
been about two to three—three for iron and
two for steel—so that in a ship taking 1200
tons of iron in its construction—by no means
an unusual figure—there will be a saving,
on this basis, of 400 tons of metal. This is
a saving that will go a long way toward
compensating for the difference in price as
between iron and steel even at the present
time; but when that difference has been
contracted to the narrow margin that may
be confidently looked for at no distant date,
there may even be a saving of first cost in
the use of steel, to say nothing of the greater
endurance of that metal and the enormous
gain in carrying capacity resulting from its
employment.

That the gradual displacement of iron by
steel for shipbuilding purposes can only be a
question of time, may, therefore, be re-
garded almost as certain as that steel has
already supplanted iron of the place it for-
merly occupied in railway construction.
Thirty years ago the plate trade could
scarcely be said to have existed. The total
production of ship plates in the United

Kingdom did not then exceed 30,000 tons.
But between 1860 and 1870 the quantity of
iron used in British steam vessels increased
from 270,000 tons to 1,700,000 tons, and at
the present time the merchant navy of
Great Britain represents in its construction
considerably over 2,000,000 tons of
iron. Mr. Charles Mark Palmer has calcu-
lated that between 1850 and 1870 no less
than 2,021,100 tons of iron were used in the
construction of 3,671,700 tons of shipping,
and we shall be within the mark if we cal-
culate that in the eight years which have
intervened since this estimate was put forth
by one of the most reliable authorities of the
day, at least 1,800,000 additional tons of
iron have been used for shipbuilding pur-
poses. At the present time the annual con-
sumption of iron ship plates in Great Britain
is not less than 250,000 tons. In the North
of England alone the production of plates
has increased from 177,000 tons in 1872, to
214,000 tons last year; and within the six
years embraced between these two dates,
this district alone has turned out upward of
1082 tons of plates, representing, at the
lowest computation, a value of £9,000,000.
The continued displacement of timber by
iron ships, and the enormous increment of
growth in the tonnage of new shipping
launched from year to year, have, up to the
present time, brought about a steady de-
velopment of the plate trade, which has now
displaced iron as the staple of the great
Cleveland district. The incidence of this
change will be observed from an examina-
tion of the annexed table, which gives the
total production of rails and plates in the
North of England for each year between
1872 and 1877, with the variations of per-
centage of total sales:

Year.	Rails. Tons.	Per cent. of total sale.	Plates. Tons.	Per cent. of total sale.
1872.....	590,074	48.50	177,857	30.45
1873.....	534,440	51.31	165,592	27.59
1874.....	565,000	41.02	175,272	31.57
1875.....	246,218	44.17	173,416	38.29
1876.....	107,832	27.50	175,374	44.00
1877.....	36,750	9.84	214,723	52.60

Within the period to which these figures
apply, the production of angles for ship-
building purposes has increased in the North
of England from 58,167 tons to 67,035 tons,
and since the decay of the rail trade it has
assumed a relatively greater importance
than before, the percentage of angles to the
total sales of finished iron having increased
from 7.50 to 17.17 between 1872 and 1877.
It will therefore be apparent that upon ship-
building more than upon anything else, the
finished iron industry of the North of Eng-
land is now dependent, and that this dis-
trict is, consequently, more than any other,
likely to be injuriously affected by the em-
ployment of steel in lieu of iron. The ex-
tent and the consequences of that injury are
contingent on so many now intermediate
conditions, that neither can be fairly esti-
mated. If the change is a very gradual and
not a galloping one, the plate manufacturers
will probably be allowed sufficient time to
adapt themselves to their altered circum-
stances without very great loss or trouble.
In the most favorable event, of course a
very large and costly plant must be ren-
dered all but useless; but this will be a less
severe dispensation if, by gradual and judi-
cious advances toward the new order of
things, manufacturers are enabled to retain
the new trade that looms in the future; and
in this connection we may refer to one of
the largest plate-making firms in the North
of England as being already on the qui vive
to meet the demands of the new era. The
Consett Iron Company, the largest plate-
making concern in the country, if not in
the world, employing more than 5000 hands
and producing 1200 tons of plates per week,
is now considering plans for the laying down
of a very extensive steel-making plant,
which will enable it to overtake the altered
requirements of its customers; and other
concerns in the same district are turning
their thoughts in the same direction.

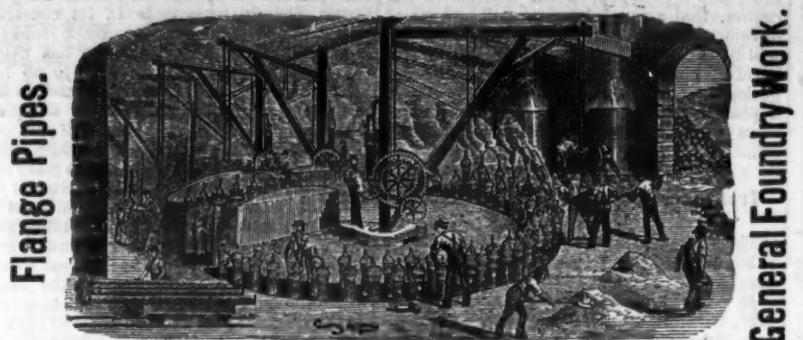
The prospects of shipbuilders and of iron
manufacturers alike, must in the near future
be largely affected by the consideration of
how far the use of steel in the place of iron
will be likely to limit the aggregate annual
consumption of these materials. Two very
obvious influences will inevitably tend to
reduce that consumption. The first of these
is the greater endurance of steel; the second
is the less quantity of steel required to
produce a given tonnage of shipping. There is
ample evidence of the fact that for rail-
way purposes the life of steel is three times
that of iron. We have not yet, however,
sufficient data to prove how far steel may
excel iron in resistance to corrosion and in
fulfilling other conditions of durability. All
we can fairly assume is that steel ships will,
in the main, have a longer life than ships
built of iron; and if the ratio is even two to
one, the difference thereby produced in the
demand for shipbuilding material must be
enormous. To the second consideration we
have named—that, viz., of the reduced
weight of steel required to produce a given
tonnage of shipping—we need hardly attach
very great importance, seeing that any de-
cline thence accruing is likely to be fully
compensated by the greater tonnage of ship-
ping that will continue henceforth, as here-
tofore, to be launched from the shipbuilding
yards of the United Kingdom. In the
twenty years dividing 1850 from 1870, the
total tonnage of vessels built and registered
in the United Kingdom rose from 133,000
tons to over 600,000 tons per annum,
while the tonnage of vessels composing
the British Navy increased in the same
period from 118,000 tons to 536,000 tons.
If this ratio of progress should continue to
be maintained, or even approached, there will
be little need to fear for the absolute declen-
sation of the industries to which it is con-
tributory.

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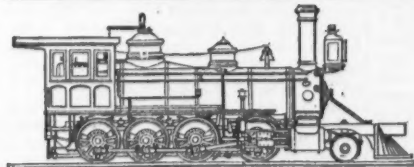
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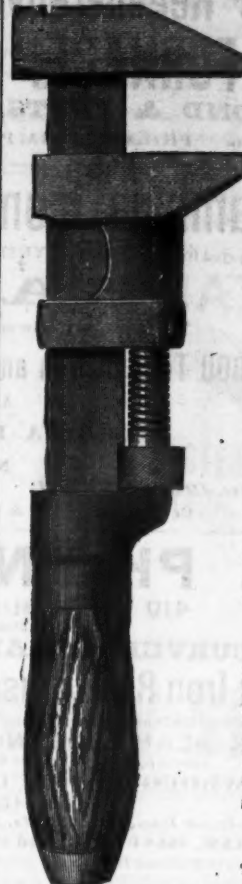
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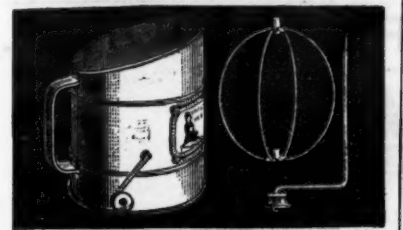
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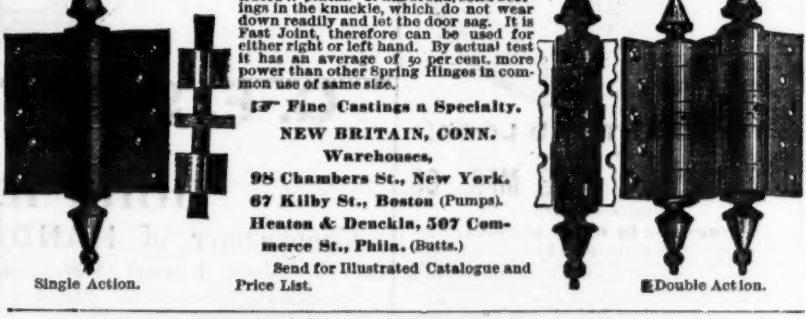
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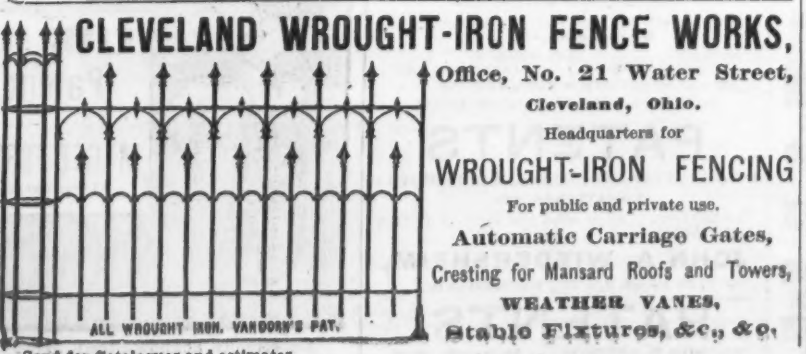
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This Hinge has two flat coil springs,
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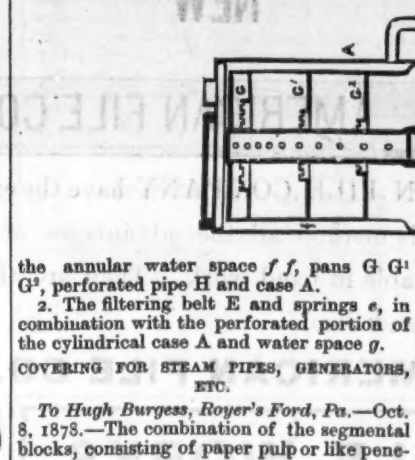


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New Patents.
We take the following abstract of new
patents, recently issued, from the official
record:
FEED WATER HEATERS, ETC.
To **Gustavus H. Jacobech, Indianapolis, Ind.**—Oct. 8, 1878.—1. The combination of the
water coil pipe D and branch pipe M with



the annular water space f f, pans G G,
G², perforated pipe H and case A.
2. The filtering belt E and springs e, in
combination with the perforated portion of
the cylindrical case A and water space g.
**COVERING FOR STEAM PIPES, GENERATORS,
ETC.**
To **Hugh Burgess, Royer's Ford, Pa.**—Oct.
8, 1878.—The combination of the segmental
blocks, consisting of paper pulp or like pene-

trable material, with the staples by which
they are secured.
**FURNACE FOR DISTILLING WOOD AND SEP-
ARATING THE PRODUCTS OF DISTILLATION.**
To **Jean A. Mathieu, Bridesburg, Phila-
delphia, Pa.**—Oct. 8, 1878.—Wood is dis-
tilled in the small inclined retorts, and the
uncondensed gases are passed through a
safety apparatus to the closed fire-boxes and
grates under the retorts. The products of
combustion from these fire-boxes are passed
into the large central distilling chamber, to
aid in the distillation of wood therein. The
condenser, provided with a central concave
diaphragm, is supplied with pyroigneous
acid, which is rapidly evaporated by the
action of an exhaust pump and spray
condenser, thus properly cooling the con-
denser.

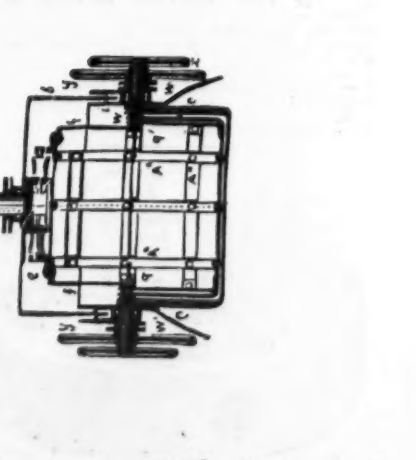
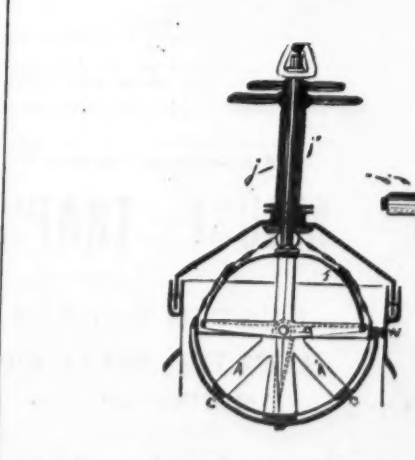
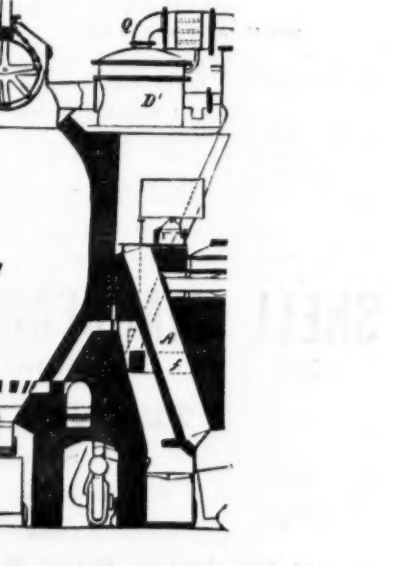
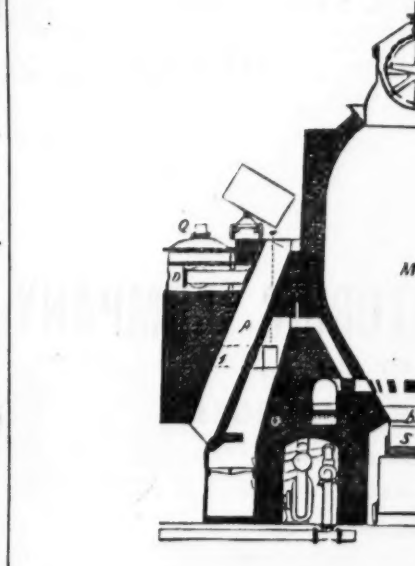


1. The combination of a retort and con-
denser, having a pipe which communicates
with the grate chamber, with a safety ap-
paratus, intermediate between the condenser
and grate chamber, whereby the passage of
flame to the condenser is prevented.
2. The combination of the spout s' and
the exit pipe of the condenser with the
safety apparatus having the induction pipe
T', dipping into a sealing liquid, and a dis-
charge pipe controlled by a valve.
3. The combination of a retort with a fan
and closed grate chamber, whose flue com-
municates with the interior of the retort,
whereby the products of combustion from

equivalent exhausting device, whereby con-
densation is effected in the one compart-
ment by the evaporation of a volatile liquid
in the other.
7. The auxiliary lids c c, in combination
with the rods w, sleeves w', and wheels s
and y, or their equivalent.
8. The combination of the lattice-work
quarter cylinders A", revolving upon the
pivots g g', with the upper half cylinder f,
lid b, barrels Q', rod j, and sleeve f'.
A New Safety Mining Powder.—The
San Francisco Press gives an account of a
series of trials made with a new powder
manufactured in that city, the object being
to test its claims to especial merit. The
powder in question is said to be so made as

to explode only by heat, percussion and
confinement, which three conditions must
be fulfilled before its explosive qualities will
appear—that is to say, it must be fired by a
proper fuse and cap and be tamped down,
otherwise no explosion will occur. If, there-
fore, a cap were fired in the powder in the
usual way, provided the cartridge was not
tamped and powder closely confined, no ex-
plosion would follow. This compound con-
tains no nitro-glycerine whatever, an in-
variable explosive chemical ingredient being
one of the salts of potash, to which are
added other substances, some of which are
necessary to the evolution of the explosive
force, while others reduce it to any degree
required for safe handling, and cure any
natural tendency to decompose or explode
spontaneously.

More American Spiegeleisen.—The
Bulletin of the Iron and Steel Association
gives the following information in regard to
a venture now being made by the Oxford Iron
Company, Oxford, N. J., in the manufacture
of spiegeleisen: The company is now making
spiegeleisen in the smaller of their two fur-
naces, which is 36 feet high and 9 1/2 feet
across the bosh. They use their own ores,
mined at Oxford, as the base, and supply
the manganese from the Spanish ore. The
product of the furnace is from nine to ten
tons of spiegeleisen daily. Mr. W. H.



the grate are forced into the retort under
pressure.
4. The combination, with a lesser retort,
A, and main retort, M, of fans and closed
grate chambers having flues communicating
with the main retort, and condensers D and
D', communicating through safety appar-
atus with the grate chambers, whereby the
non-condensable gases from both retorts are
burned, and the products of combustion
forced into the main retort under pressure.
5. The combination of a retort having a
concave bottom, with an arch, or vault,
of refractory material, constructed independ-
ently of the retort, but in close contact
throughout with the concave surface there-
of, and maintained in position thereby.
6. The condensers D', formed in two
separate compartments, d and d', the latter
communicating with an air pump, or other

Scranton, the general manager of the
works, says this is an experimental venture
and he cannot tell yet whether he will find
it sufficiently profitable to continue the
manufacture.

Speed on Narrow-Gauge Railways.—
In a paper recently read by Graham Smith
before the Liverpool Engineering Society, a
statement frequently made that sufficiently
high rates of speed cannot be got out of
narrow-gauge roads is contradicted. Mr.
Smith cites the Trestling line in North
Wales, where 35 miles an hour is not un-
known, although the gauge is only 1 foot
11 1/2 inches. Of course the lines must be
properly laid out and constructed. In 1869
this line carried 9700 passengers and 136,700
tons of goods, and was not worked up to
full capacity.



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Paris, 1878.



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HILL'S Patent Nut Cracker.

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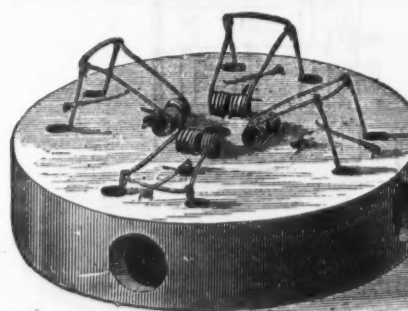
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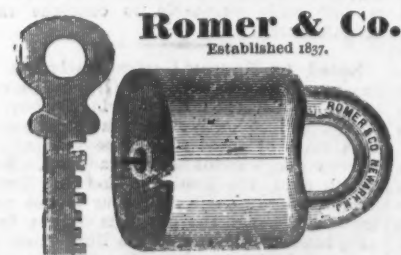
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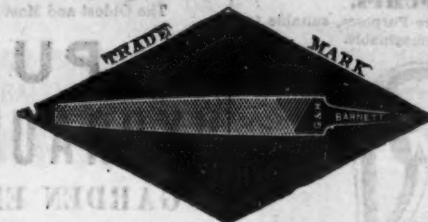
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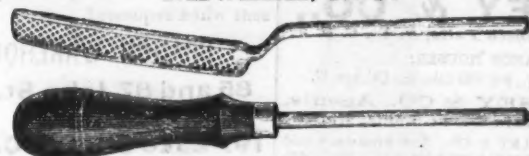
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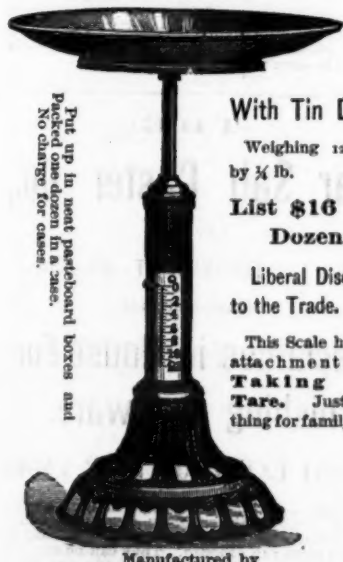
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London, 1862; Oporto, 1865; Dublin, 1865; Paris,
1867; Moscow, 1873; Vienna, 1873, and Phila-
delphia, 1876.

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Original Inventors and Sole Patentees of

Noiseless Self-Coiling Revolving STEEL SHUTTERS,

FIRE AND BURGLAR PROOF.
ALSO IMPROVED

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Of various kinds. Endorsed by the Lead-
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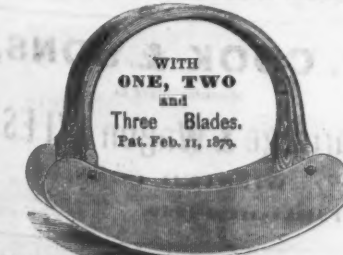
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WITH
ONE, TWO
and
Three Blades.
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Automatic Fountain Penholder, Novelty Pen Clip,
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Entirely fire-proof, undecaying and the best non-
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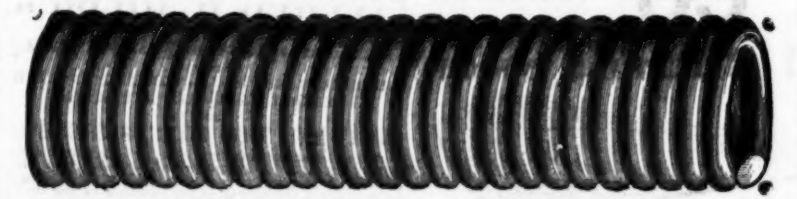
Out Showing Round Platform.

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The Ansonia Corrugated Stove Platform, with its heavy figured edge border, is believed to be the best Platform offered to the trade. As shown in the illustrated section herewith it requires no nailing to keep it in place or to prevent it from turning up at the edge; while the metal is of sufficient thickness to require no lining.

The low price, superior quality and fine finish of this Platform will be readily acknowl-
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The Ansonia Brass Spring Wire is made to combine the qualities of uniformity of temper, great power of resistance and recovery, toughness and accuracy of gauge. Each bundle of wire, before it leaves the works, is subjected to test in a machine which records the deflection and molecular displacement under transverse stress and torsion, and is especially adapted to making spiral springs for mowing and reaping machines, harvesters and for all purposes for which the highest grade of spring wire is required.

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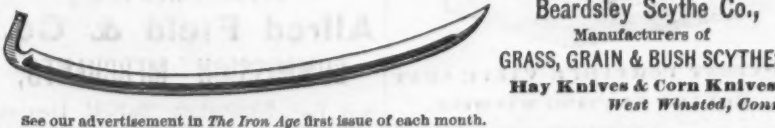


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Solid Vulcanite
EMERY WHEELS**
LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.
The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding, and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These Wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Safes, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.



**PATENT ELASTIC
Rubber Back Square Packing**
BEST IN THE WORLD.
For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps.
B represents that part of the packing which, when in use, is in contact with the Piston rod.
A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction.
This Packing is made in lengths of about 30 feet, and of all sizes from 1/4 to 2 inches square.

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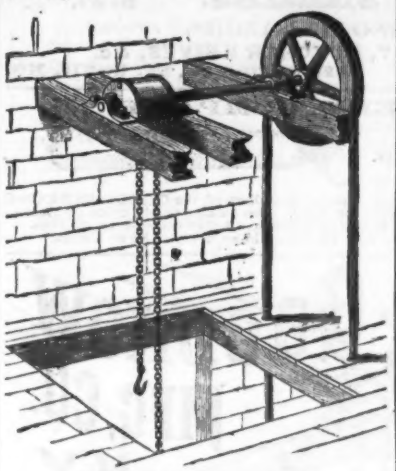
HARDWARE MANUFACTURERS' AGENTS, as follows:

Lawrence Curry Comb Co.,
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Jacobus & Nivtek Mfg. Co.,
Locks, &c.
Sandusky Tool Co.,
Planes and Planes, &c.
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Measuring Tapes.

Weston's Safety Hoists.

Weston's Differential Pulley Blocks are known to engineers and machinists in every part of the world, as an almost indispensable device for the handling of machinery. Although best known by this, his earliest important invention, Mr. Thos. A. Weston is the inventor of numerous other mechanical devices, nearly all of which relate more or less directly to hoisting machinery.

One of the simplest and most generally useful of these is the so-called "Double Lift," illustrated in the accompanying engraving.



WESTON'S "DOUBLE LIFT."

This machine is intended to take the place of the common rope wheel and barrel (whether geared or not) which for centuries has been used for lifting weights to the upper floors of buildings. The improved machine occupies far less space than the old, costs less, is more efficient and safer. The mechanism of one of 500 pounds capacity, complete, weighs only 80 pounds. The hoisting chain is provided with a hook at each end, either of which may at any time be used either for hoisting or lowering. It thus has double the efficiency of a single ended chain or rope, since whenever either hook is at one end of the hoistway the other hook is at the other, and thus a hook is always ready for use, no matter whether the load to be handled be at the top or bottom of the hoistway.

Perhaps the most noticeable feature of it is its safety quality. It holds the load suspended at any point and at all times. To lower the load it is necessary to run the hand rope backwards. The action in doing this is very light and easy, and so long as continued the load will continue to descend. If, however, the backward action of the hand rope be stopped, or if the rope be let go, the load will quietly come to rest, and remain suspended. Accidents from too rapid lowering are thus made absolutely impossible.

These machines have a capacity of 500, 1000, 1500 and 2000 pounds, and are made by the Yale Lock Manufacturing Company, Stamford, Conn. The New York salesroom of this company is at 53 Chambers street. Mr. Weston is now associated with the company as engineer. The price of the 500 pounds machine is \$25, complete. In addition to these machines, the company is manufacturing a large line of hoisting machinery adapted to almost every purpose, and embodying the numerous improvements and devices covered by the inventions of Mr. Weston.

Preparations for Tunneling the North River.

Dr. I. I. Hayes, the Arctic explorer, appears in the New York Legislature as the earnest advocate of a general law "to provide for excavating, tunneling and bridging, for transportation purposes, within the villages and cities of this State." The measure has more than ordinary significance, and probably few recognize under the cover of this general act the well-known "Hudson Tunnel Railroad Company," which for several years contended in the courts of New Jersey with the Delaware and Lackawanna Railroad Company, for the right to fix one terminus of its tunnel at the site chosen, and partially excavated, in Jersey City. All legal impediments at that point having been at length overcome, it now only remains to secure similar rights in the State of New York, where the streets are under the exclusive control of the local corporation. The proposed law enables the Tunnel Company to go under the streets, but confers no right to disturb the surface. Depot facilities or other needed accommodations can be acquired by purchase hereafter, in the usual way. Some confusion has arisen from a clause in the bill conferring surface rights, but this feature was retained through inadvertence (the bill having been originally drawn up with reference to a proposed road in Buffalo), and will now be stricken out.

We have seen the gentlemen who are engaged in the tunnel project within the last week, and they claim, with evident truth, to be possessed of ample capital, estimated at some \$10,000,000. They furthermore express themselves as convinced beyond a doubt of the feasibility of the undertaking and its vast prospective commercial importance. Said one of them, who from the outset has been foremost in pushing through the obstacles successively presented: "There are thirteen railway routes terminating at Jersey City and controlling nearly all the trade of the West; all are struggling to reach New York city, the great commercial center, but encounter a barrier at the Hudson River." The Tunnel Company argue further, that through the routes indicated there are now discharged in New York city the passengers and freight received from about 300 trains daily, including a large amount of mail and express matter forwarded by numerous ocean steamers. The transfer across the river between New York and Jersey City, is constantly obstructed by delay incident to reshipment, and especially to the uncertain movement of ferry boats during the fog and ice blockades of winter.

The company, which now holds itself in readiness for work, intends to construct a tunnel of solid masonry, of sufficient capacity to permit the conveyance of all passengers and freight bound to or from New York city, without change of cars and without delay or hazard.

Of the engineering difficulties to be overcome we have spoken already in these columns, and it is premature to remark further until legislative authority to proceed is fully obtained. In regard to the terminus within New York city, as to the precise location of depots, turn-tables, &c., all is left to the decision of commissioners provided for in the bill of Dr. Hayes, now under consideration. Suffice it to say that opposition is encountered only in the hostility of the Vanderbilt interest, represented by the Hudson River and New York Central Railroad. With this single exception, so we are informed, the tunnel is universally approved. On the other hand, without assuming to speak definitely of the views entertained by the various railway corporations who have large investments in New Jersey, it could hardly be expected that innovations upon present arrangements so radical as those now contemplated, would be allowed without at least some show of remonstrance.

The Hudson River Tunnel Company was incorporated under the general railroad laws of the State of New Jersey, May 26, 1873; capital, \$10,000,000. The principal directors were: Trenor W. Park, of the Union Pacific Railroad; De Witt O. Haskin and J. C. Tucker. The other directors were A. B. Gibbs, L. C. Fowler, William Martin and C. Goddard. The original subscribers to the stock were: D. C. Haskin, California; William Martin, New York; Theodore F. Wood, Jersey City; L. C. Fowler, California; George F. Seward, New York; T. W. Park, Vermont; C. Goddard, New York; A. C. Foster, New York; Wm. J. Osborn, New York; C. H. Dearing, New York; G. H. Clows, New York; A. A. Selover, New York; George Miller and John F. Ward, Jersey City, N. J.; Albert B. Gibbs, New York; Wm. M. Force and L. M. Price, Newark, N. J.; J. Tucker, New York; James S. Wethered, Englewood, N. J.; Ira A. Kip, George A. Thayer and David Crocker, New York; James E. Nuttman, New Jersey; J. W. Haskins, California; A. S. Roberts, New York. Each of these took 10 shares, with the exception of Theodore F. Wood, who subscribed for one, making 241 shares in all. The remainder of the stock found purchasers in the West, Senator Jones, of Nevada, among others, taking a large share.

Col. W. H. Paine, of the New York Bridge Company, was chosen engineer.

Judge Blatchford's Injunction Upon Nickel Plating.

Judge Blatchford, on Monday, the 10th inst., rendered his decision in the case of the United Nickel Company vs. the Manhattan Brass Co., J. H. White, J. H. Crane and H. L. Coe, the same, W. H. Jackson, and others. It will be remembered that voluminous affidavits were made and much testimony, oral and documentary, given before Judge Blatchford, in the United States Circuit Court, a few weeks ago, in behalf of the defendants, Senator Roscoe Conkling delivering the principal address. The court reserved its decision, which has been awaited with deep interest throughout all the trades in which nickel is used.

In the decision now rendered, filling 17 folios of legal cap, Judge Blatchford reviews the whole ground as to the claims made, and the solutions and processes employed. He remarks that the defendants in these suits united with various other nickel platers in their defense of the suit brought by the plaintiffs in the United States Circuit Court against Harris and Weston, and made substantially the same defense and answers. Judge Blatchford decides that the process employed by the defendants gives a coherent, consistent and tenacious coating of nickel; that the means by which this coating is secured are described in Adams' patent of 1869, and that no practical plating can be done unless that process is used.

The opposition to the motion for an injunction was based upon the affidavits of chemical experts, Prof. Seelye, Doremus and others, the object being to establish that the Court reached an erroneous conclusion in the suit against Harris and Weston, and ought to reverse that decision. Judge Blatchford says he has examined the affidavits and testimony, both oral and written, and is unable to see that anything new has been advanced in the evidence and arguments since presented, or that the judgment originally rendered did not advert to all the points now urged for the defense. He reviews at length the testimony of the several chemical experts, and remarks with reference to it that the gist of the argument on their part is that if the first claim under the patent is for the exclusion of sulphates and chlorides, any such claim has not been infringed, and he therefore proceeds to examine with considerable minuteness all that has been said respecting the substance, use and application of various chemicals, many of the observations thus made being too profound for general comprehension. The patent in question has been sustained in the first and second circuits. The plaintiffs show that they have granted some sixty licenses under it in the States of Massachusetts, Connecticut, New York, Ohio, Pennsylvania, Maryland, Maine and Rhode Island, and that they are willing to grant licenses to responsible manufacturers on fair and equitable terms. They are entitled to be protected in their rights, and preliminary injunctions must issue in the case of the defendants named.

The electric light in the Billingsgate Market, London, has been abandoned. The vendors of the market were much dissatisfied with it, some of them even asserting that the light had the extraordinary effect of changing mackerel into whiting.

The trustees of the British Museum, who excluded gas on account of the danger of fire which it entailed, and were, in consequence, forced to close the doors to visitors during the evening hours, have adopted the electric light.

Cutlery.

FRIEDMANN & LAUTERJUNG,

Manufacturers of
PEN AND POCKET CUTLERY,
 Solid Steel Scissors, Shears, Razors, &c.
 Sole proprietors of the renowned full concave patent
"ELECTRIC RAZORS,"
 And the celebrated **"ELECTRIC SHEARS."** Nickel Plated
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 Agents for the **BENGAL RAZORS.**
AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.
 91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

MERIDEN CUTLERY COMPANY.

THE "PATENT IVORY" HANDLE TABLE KNIFE.

The oldest manufacturers of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE
 for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE,
 BUTCHER AND HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application.
 No. 49 Chambers Street, New York.

THE
LAMSON & GOODNOW
88 CHAMBERS ST.
MFG. CO. N.Y.
AMERICAN TABLE CUTLERY &c.

AARON BURKINSHAW,
 Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass.
 My Blades are forged by hand from the best Cast Steel, and warrant-
 ed. To me was awarded the Gold Medal of the Conn. State Agricultural Society.
 Office in New York with E. P. Whipple, 100 Chambers St. Established 1853.

NAUGATUCK CUTLERY CO.,
 Manufacturers of FINE PEN & POCKET CUTLERY.
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Improved
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WAREHOUSES,
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No. 113, Improved Adjustable Circular Plane - \$4.00



CATALOGUE SENT ON APPLICATION

Door-Jamb Bolts.

These are a decided improvement over either
 mortise or surface bolts. They are much stronger,
 quicker handled, more compact, and are not af-
 fected by the door settling or warping.
 The projection from Bolt with its anchor is let
 into the face of the jamb, secured by heavy
 screws, and the square frame of the bolt is let
 into the edge of the casing. The small plate is
 put upon the face of the door, and the bolt is
 pushed out over it.
 If by accident the bolt is pushed out when the
 door is open, it will be thrown back by the door
 closing.
 Send for catalogue to

PAYSON & CO.,

MANUFACTURERS OF

Builders' Hardware,

1319 to 1325 West Jackson St.,
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No. 77.

Cutlery.

HAVE YOUR HAIR CUT.



Clark's Hair Clipper.

Extensively used and the only reliable machine
 for close clipping.
 Simple in operation and finishes the work in
 short time.

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Sole Agents,

139 Duane Street, New York.

Silver Medal, 1878-Paris.



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Table Knives, Razors, Shovels, &c., &c.,
 of every description.

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Granted 1749.

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Celebrated I-XL Cutlery, Razors, &c.

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Best Cast Steel

SHEEP SHEARS.

Equal to any in quality and finish, and lower in
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We also attach to these Shears the

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of which we have exclusive control. This is a great
 improvement. It effectually prevents sticking
 and cutting the sheep, and enables the operator to
 shear faster and smoother.

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And of

BALL'S PAT. SOLID STEEL SHEEP SHEARS.

These shears are unsurpassed for cheapness, dura-
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 of steel from point to point, and cannot be broken in
 use either in the bow or at the junction of the shank
 and blade. Samples can be seen at above address, or
 sample lots furnished.

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The demand for Joseph Rodgers & Sons'

productions having considerably increased, they

have, in order to meet it, greatly extended their

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To distinguish Articles of Joseph Rodgers

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Young's Patent Folding Scissors.



Having largely increased our facilities for the manu-
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 the trade at a large reduction from our former
 prices. The list price of the large size is now \$12.00
 per dozen, formerly \$18.00, and the small size, \$9.00,
 formerly \$12.00. The material used in the manu-
 facture of Young's Patent Folding Scissors is the
 very best. All are nickel-plated and furnished with
 a neat morocco case.

MARX BROS., Proprietors,

430 Broadway, New York.

P. O. Box 362.

ESTABLISHED 1836.

Alfred Field & Co.,

COMMISSION MERCHANTS,

New York, Birmingham, Sheffield, Liverpool.

Guns and Pocket Cutlery,

SPECIALTIES.

Headquarters for

ELEY'S BROS.' GOODS, WRIGHT'S ANVILS,

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All sorts of Hardware and Merchandise for im-
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Established in 1839.

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WORCESTER,

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Successors to

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Manufacturers of

THE GENUINE

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Screw

Wrenches.

PATENTED,

May 2, 1871.

December 26, 1871.

December 28, 1875.

August 1, 1876.

The back strain when the wrench is used is borne
 by the bar—not by the handle.
 The strongest Wrench made, and the only suc-
 cessful Re-enforced Bar.

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Our Agents, GRAHAM & HAINES, 113 Chambers St.,
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 pleased to serve you at factory prices.

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Star Salt Caster Co.,

OFFICE:

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**Specialties in House Fur-
 nishing Hardware.**

PATENT EXTENSION DOOR KNOBS

(Pat. Jan. 29, 1878) manufactured in every variety
 of style. Silver-Glass, Silver-Center, Fine Cut,
 &c. Fitted with heavy silver-plated mountings.
 Extend from 1 to 3 inches. They can be adjusted
 to doors of any thickness without the annoyance
 of the old-fashioned washers and pins. Our
 "Patent Chamber" (Pat. Nov. 6, 1877) prevents all
 possibility of the bursting of the glass bulbs.
 A trial will make plain their merits.
 Send for illustrated price lists and circulars.

THE STAR SALT CASTER CO.,

BOSTON, MASS.

EVERY HARDWARE DEALER

Should handle the

NEW BUCKEYE SCROLL SAW,

and send at once for our circular
 and special discount. The
 Buckeye is the cheapest, strong-
 est and most desirable saw in
 the market. Address

A. E. FOLGER & CO.,

Springfield, Ohio.

RIEHLE BROS.

Office and Works, 9th St., above Master, Phila.
 Warehouses, 20 & 22 S. 4th St., above Chestnut, Phila.
 New York Store, 51 Liberty Street.

STANDARD

SCALES

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"Patented" Furnace Charging Scale.

Double Beam R. R. Track Scale, Compound Parallel
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 Scales. Testing Machines any capacity.
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R. COOK & SONS,

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W. & J. TIEBOUT,

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COLEMAN EAGLE BOLT WORKS

ESTABLISHED 1845.

WELSH & LEA. NORWAY IRON CARRIAGE & TIRE BOLTS, AXLE CLIPS, &c.

Highest and only Awards and Medals, Philadelphia, 1876, and Paris, 1878.

WORKS, Columbia Avenue, Hancock and Mascher Streets.

OFFICE, 145 Columbia Avenue (late 2030 Arch St.)

PHILADELPHIA, U. S. A.

ROGERS CUTLERY COMPANY, Hartford, Conn.



WM. ROGERS,
Senior Member and Manager of the Firm of ROGERS BROTHERS. Died Feb. 17, 1872.



ASA H. ROGERS,
Of the original ROGERS BROTHERS, and half owner of the Rogers Cutlery Co., when organized. Died Oct. 4, 1876.



F. WILLSON ROGERS,
Son of the late Wm. Rogers, and Secretary of the ROGERS CUTLERY CO.



Our Knives stamped as above we guarantee

To Strip 12 dwts. of Silver per dozen.

Our Knives are guaranteed to be

ALL HAND BURNISHED,

and are put up in rack boxes with

hinge covers.

WE GUARANTEE our Spoons, Forks, &c. to be Plated 25 Per Cent. **HEAVIER** THAN STANDARD PLATE.

We guarantee Spoons, Forks, &c. to be plated on **15 PER CENT. NICKEL SILVER, AS FOLLOWS:**
On TEA SPOONS, 2½ ounces, or 50 dwts. per gross.
On DESSERT SPOONS, 3½ " " " 75 " "
On TABLE SPOONS, 5 " " " 100 " "
On DESSERT FORKS, 3½ " " " 75 " "
On MEDIUM FORKS, 5 " " " 100 " "

OUR SPOONS, FORKS, LADLES, &c. ARE STAMPED

On EXTRA PLATE, . . . 1871, ROGERS @ 5 oz.

On DOUBLE PLATE, . . . 1871, ROGERS @ 8 oz.

On TRIPLE PLATE, . . . 1871, ROGERS @ 12 oz.

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All Hollow Ware stamped as above is warranted to be plated

50 PER CENT. HEAVIER

than any other brand of goods.

Our Hollow Ware in addition to our trade mark is stamped

SEXTUPLE PLATE,

we being the only firm who manufacture this weight of plate.

THE ABOVE IS A FAC-SIMILE OF OUR GUARANTEE CARD WHICH ACCOMPANIES EACH DOZEN OF OUR FLAT WARE, AND EACH PIECE OF OUR HOLLOW WARE. Our goods have been in the market since 1871, and are acknowledged by all dealers, who have tried them, to be THE BEST.

We would call especial attention to the EXTRA STRONG SPRING TEMPERED SHANK, which we have on our Tipped, Fiddle, Saxon and Imperial patterns.

The Huntsman Family and Cast Steel.

On the evening of February 20th ult., Mr. Francis Huntsman died at his home, near Doncaster, England, at the venerable age of 95. The deceased gentleman was a member of a family of which Sheffield has just cause to be proud, for it is to the invention of cast steel by Mr. Huntsman's grandfather that the town owes its present position. Mr. Francis Huntsman carried on business in conjunction with his son in Church street, Attercliffe, but he has not of late years taken a very active part in the management, in consequence of old age. He was scrupulously honest and straightforward in all his dealings. In his business he took care that the manufactures he turned out should worthily sustain the high name the firm had attained. Though he inherited from his father the secret of the manufacture of cast steel, yet he had wonderfully improved on the invention, and the article he turned out had a world-wide reputation. The deceased gentleman leaves one son—Mr. Benjamin Huntsman, of Retford—by whom, with his son, Mr. Francis Huntsman, the business will still be carried on. His wife died some ten years ago.

Samuel Smiles, in his volume of "Industrial Biography" devoted to iron masters and tool makers, gives the following account of the invention of cast steel, which is probably authentic, and will be read with interest in connection with the news of Francis Huntsman's death:

The invention of cast steel is due to Benjamin Huntsman, of Attercliffe, near Sheffield. M. Le Play, Professor of Metallurgy in the Royal School of Mines of France, after making careful inquiry and weighing all the evidence on the subject, arrived at the conclusion that the invention fairly belongs to Huntsman. The French professor speaks of it as a "memorable discovery," made and applied with admirable perseverance; and he claims for its inventor the distinguished merit of advancing the steel manufactures of Yorkshire to the first rank, and powerfully contributing to the establishment on a firm foundation of the industrial and commercial supremacy of Great Britain. It is remarkable that a French writer should have been among the first to direct public attention to the merits of this inventor, and to have first published the few facts known as to his history in a French government report—showing the neglect which men of his class have heretofore received at home, and the much greater esteem in which they are held by scientific foreigners. Le Play, in his enthusiastic admiration of the discoverer of so potent a metal as cast steel, paid a visit to Huntsman's grave in Attercliffe Churchyard, near Sheffield, and from the inscription on his tombstone recites the facts of his birth, his death and his brief history. With the assistance of his descendants, we are now enabled to add the following record of the life and labors of this remarkable, but almost forgotten man:

Benjamin Huntsman was born in Lincolnshire in the year 1704. His parents were of German extraction, and had settled in this country only a few years previous to his birth. The boy being of an ingenious turn, was bred to a mechanical calling; and becoming celebrated for his expertness in repairing clocks, he eventually set up in business as a clock maker and mender in the town of Doncaster. He also undertook various other kinds of metal work, such as the making and repairing of locks, smoke-jacks, roasting-jacks and other articles requiring mechanical skill. He was remarkably shrewd, observant, thoughtful and practical; so much so, that he came to be regarded as the "wise man" of his neighborhood, and was not only consulted as to repairs of machinery, but also of the human frame. He practiced surgery with dexterity, though after an empirical fashion, and was held in especial esteem as an oculist. His success was such that his advice was sought in many surgical diseases, and he was always ready to give it, but declined receiving any payment in return.

In the exercise of his mechanical calling he introduced several improved tools, but was much hindered by the inferior quality of the metal supplied to him, which was common German steel. He also experienced considerable difficulty in finding a material suitable for the spring and pendulums of his clocks. These circumstances induced him to turn his attention to the making of a better kind of steel than was then procurable, for the purposes of his trade. His first experiments were conducted at Doncaster; but as fuel was difficult to be had at that place, he determined, for greater convenience, to remove to the neighborhood of Sheffield, which he did in 1740. He first settled at Hamsworth, a few miles to the south of that town, and there pursued his investigations in secret. Unfortunately, no records have been preserved of the methods which he adopted in overcoming the difficulties he had necessarily to encounter. That they must have been great is certain, for the process of manufacturing cast steel of a first-rate quality, even at this day, is of a most elaborate and delicate character, requiring to be carefully watched in its various stages. He had not only to discover the fuel and flux suitable for his purpose, but to build such a furnace and make such a crucible as should sustain a heat more intense than any then known in metallurgy. Ingot molds had not yet been cast, nor were there hoops and wedges made that would hold them together; nor, in short, were any of those materials at his disposal which are now so familiar at every melting furnace.

Huntsman's experiments extended over many years before the desired result was achieved. Long after his death, the memoirs of the numerous failures through which he toilsomely worked his way to success

* M. Le Play's two elaborate and admirable reports on the manufacture of steel, published in the *Annales des Mines*, Vols. III and LX, 4th series, are unique of their kind, and have as yet no counterpart in English literature. They are respectively entitled, "Mémoire sur la Fabrication de l'Acier en Yorkshire," and "Mémoire sur la Fabrication et le Commerce des Fers à Acier dans le Nord de l'Europe."

† There are several clocks still in existence in the neighborhood of Doncaster made by Benjamin Huntsman; and there is one in the possession of his grandson, with a pendulum made of cast steel. The manufacture of a pendulum of such a material at that early date is certainly curious; its still perfect spring and elasticity showing the scrupulous care with which it had been made.

were brought to light, in the shape of many hundredweights of steel, found buried in the earth in different places about his manufactory. From the number of these wrecks of early experiments, it is clear that he had worked continuously upon his grand idea of purifying the raw steel then in use, by melting it with fluxes at an intense heat in closed earthen crucibles. The buried masses were found in various stages of failure, arising from imperfect melting, breaking of crucibles and bad fluxes, and had been hid away as so much spoiled steel of which nothing could be made. At last his perseverance was rewarded and his invention perfected; and although a hundred years have passed since Huntsman's discovery, the description of fuel (coke) which he first applied for the purpose of melting the steel, and the crucibles and furnaces which he used, are, for the most part, similar to those in use at the present day. Although the making of cast steel is conducted with greater economy and dexterity, owing to increased experience, it is questionable whether any maker has since been able to surpass the quality of Huntsman's manufacture.

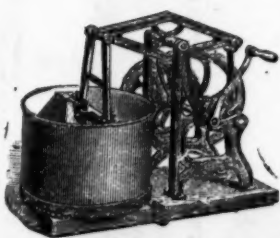
The process of making cast steel, as invented by Benjamin Huntsman, may be thus summarily described: The melting is conducted in clay pots, or crucibles, manufactured for the purpose, capable of holding about 34 pounds each. Ten or twelve of such crucibles are placed in a melting furnace similar to that used by brass foundries, and when the furnace and pots are at a white heat, to which they are raised by a coke fire, they are charged with bar steel, reduced to a certain degree of hardness, and broken into pieces of about a pound each. When the pots are all thus charged with steel, lids are placed over them, the furnace is filled with coke and the cover put down. Under the intense heat to which the metal is exposed, it undergoes an apparent ebullition. When the furnace requires feeding, the workmen take the opportunity of lifting the lid of each crucible and judging how far the process has advanced. After about three hours' exposure to the heat, the metal is ready for "teeming." The completion of the melting process is known by the subsidence of all ebullition, and by the clear surface of the melted metal, which is of a dazzling brilliancy, like the sun when looked at with the naked eye on a clear day. The pots are then lifted out of their place, and the liquid steel is poured into ingots of the shape and size required. The pots are replaced, filled again, and the process is repeated; the red-hot pots thus serving for three successive charges, after which they are rejected as useless.

When Huntsman had perfected his invention, it would naturally occur to him that the new metal might be employed for other purposes besides clock-springs and pendulums. The business of clock-making was then of a very limited character, and it could scarcely have been worth his while to pursue so extensive and costly a series of experiments merely to supply the requirements of that trade. It is more probable that at an early stage of his investigations he shrewdly foresaw the extensive uses to which cast steel might be applied in the manufacture of tools and cutlery of a superior kind; and we accordingly find him early endeavoring to persuade the manufacturers of Sheffield to employ it in the manufacture of knives and razors. But the cutlers obstinately refused to work a material so much harder than that which they had been accustomed to use; and for a time he gave up all hopes of creating a demand in that quarter. Foiled in his endeavors to sell his steel at home, Huntsman turned his attention to foreign markets; and he soon found he could readily sell abroad all he could make. The merit of employing cast steel for general purposes belongs to the French, always so quick to appreciate the advantages of any new discovery, and for a time the whole of the cast steel that Huntsman could manufacture was exported to France.

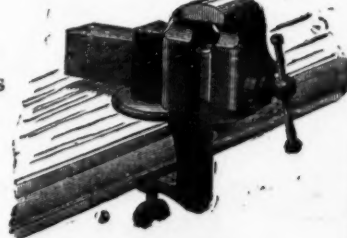
When he had fairly established his business with that country, the Sheffield cutlers became alarmed at the reputation which cast steel was acquiring abroad; and when they heard of the preference displayed by English as well as French consumers for the cutlery manufactured of that metal, they readily apprehended the serious consequences that must necessarily result to their own trade if cast steel came into general use. They then appointed a deputation to wait upon Sir George Saville, one of the members for the County of York, and requested him to use his influence with the government to obtain an order to prohibit the exportation of cast steel. But on learning from the deputation that the Sheffield manufacturers themselves would not make use of the new steel, he positively declined to comply with their request. It was indeed fortunate for the interests of the town that the object of the deputation was defeated, for at that time Mr. Huntsman had very pressing and favorable offers from some spirited manufacturers in Birmingham to remove his furnaces to that place; and it is extremely probable that, had the business of cast-steel making become established there, one of the most important and lucrative branches of its trade would have been lost to the town of Sheffield.

The Sheffield makers were, therefore, under the necessity of using the cast steel, if they would retain their trade in cutlery against France; and Huntsman's home trade rapidly increased. And then began the efforts of the Sheffield men to wrest his secret from him; for Huntsman had not taken out any patent for his invention, his only protection being in preserving his process as much a mystery as possible. All the workmen employed by him were pledged to inviolable secrecy; strangers were carefully excluded from the works; and the whole of the steel made was melted during the night. There were many speculations abroad as to Huntsman's process. It was generally believed that his secret consisted in the flux which he employed to make the metal melt more readily; and it leaked out among the workmen that he used broken bottles for the purpose. Some of the manufacturers, who, by prying and bribing, got an inkling of the process, followed Huntsman implicitly in this respect; and they would not allow their own workmen or flux the pots, lest they also should

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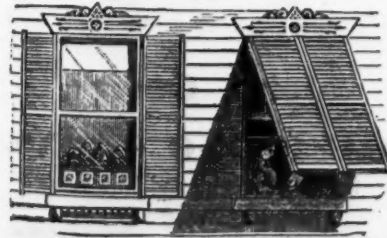


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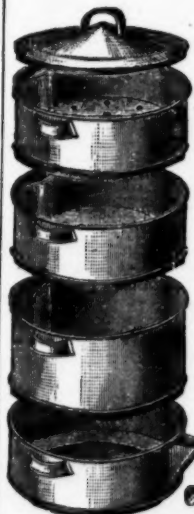


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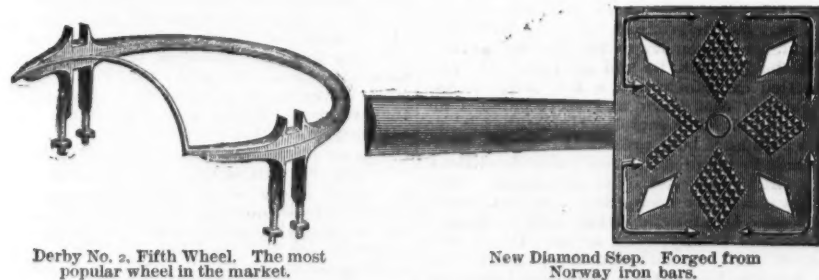
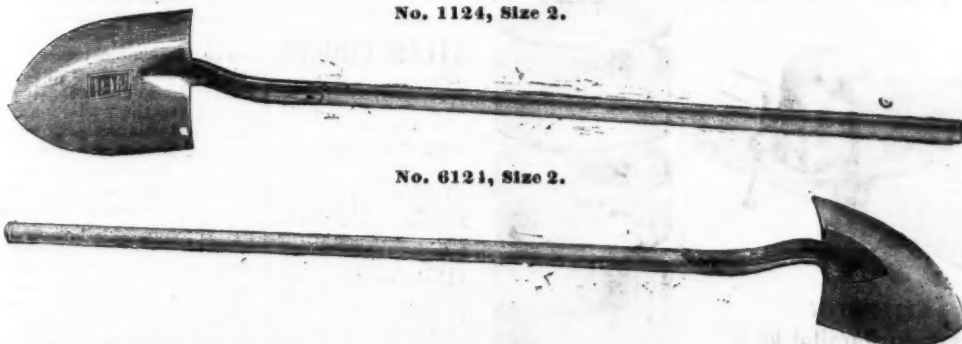
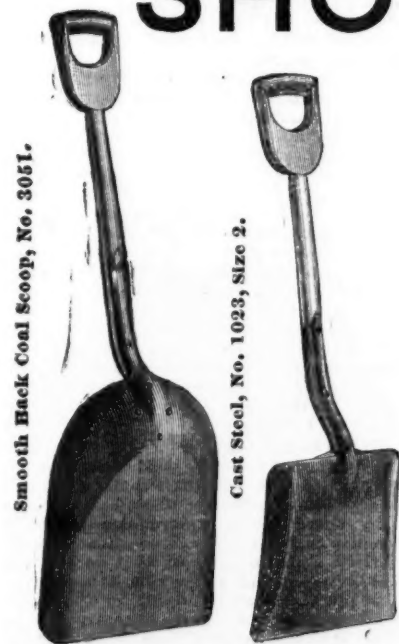
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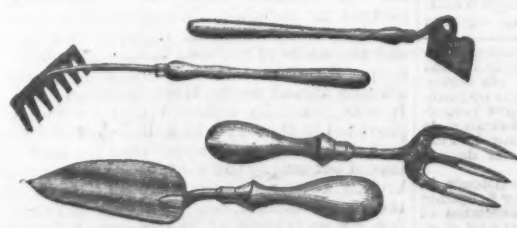
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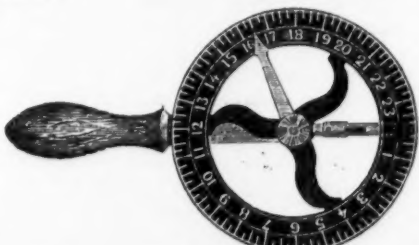
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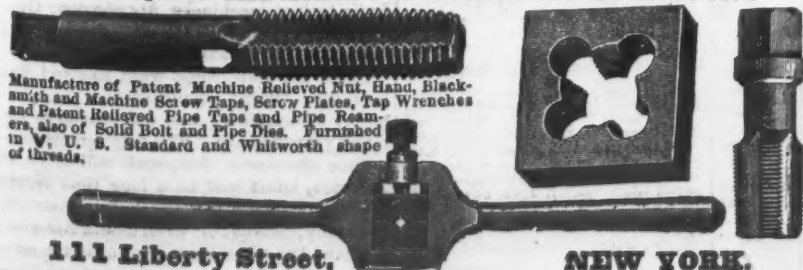
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obtain possession of the secret. But it
turned out eventually that no such flux
was necessary, and the practice has
long been discontinued. A Frenchman
named Jars, frequently quoted by Le Play
in his account of the manufacture of steel
in Yorkshire,* paid a visit to Sheffield tow-
ard the end of last century, and described
the process so far as he was permitted to
examine it. According to his statement, all
kinds of fragments of broken steel were
used; but this is corrected by Le Play, who
states that only the best bar-steel, manufac-
tured of Dannemora iron, was employed.
Jars adds that "the steel is put into the
crucible with a flux, the composition of
which is kept secret;" and he states that
the time then occupied in the conversion
was five hours.

It is said that the person who first suc-
ceeded in copying Huntsman's process was
an iron founder named Walker, who carried
on his business at Greenside, near Sheffield;
and it was certainly there that the making
of cast-steel was next begun. Walker
adopted the "ruse" of disguising himself
as a tramp, and, feigning great distress and
abject poverty, he appeared, shivering, at
the door of Huntsman's foundry late one
night when the workmen were about to
begin their labors at steel-casting, and
asked for admission to warm himself by the
furnace fire. The workmen's hearts were
moved, and they permitted him to enter.
We have the above facts from the descend-
ants of the Huntsman family; but we add
the traditional story preserved in the neigh-
borhood, as given in a well-known book on
metallurgy:

"One cold winter's night, while the snow
was falling in heavy flakes, and the man-
ufacture threw its red glare of light over
the neighborhood, a person of the most
abject appearance presented himself at the
entrance, praying for permission to share
the warmth and shelter which it afforded.
The humane workmen found the appeal
irresistible, and the apparent beggar was
permitted to take up his quarters in a warm
corner of the building. A careful scrutiny
would have discovered little real sleep in
the drowsiness which seemed to overtake
the stranger, for he eagerly watched every
movement of the workmen while they went
through the operations of the newly dis-
covered process. He observed, first of all,
that bars of blistered steel were broken into
small pieces, two or three inches in length,
and placed in crucibles of fire-clay. When
nearly full, a little green glass broken into
small fragments was spread over the top,
and the whole covered over with a closely
fitting cover. The crucibles were then
placed in a furnace previously prepared for
them; and after a lapse of from three to
four hours, during which the crucibles
were examined from time to time to
see that the metal was thoroughly melted
and incorporated, the workmen proceeded
to lift the crucible from its place on
the furnace by means of tongs, and
its molten contents, blazing, sparkling and
spurring, were poured into a mold of cast
iron previously prepared; here it was suf-
fered to cool, while the crucibles were again
filled and the process repeated. When cool,
the mold was unscrewed and a bar of cast
steel presented itself, which only required
the aid of the hammerman to form a finished
bar of cast steel. How the unauthorized
spectator of these operations effected his
escape without detection, tradition does
not say; but it tells us that, before
many months had passed, the Huntsman
Manufactory was not the only one where
cast steel was produced."

However the facts may be, the discovery
of the elder Huntsman proved of the great-
est advantage to Sheffield, for there is
scarcely a civilized country where Sheffield
steel is not largely used, either in its most
highly finished forms of cutlery or as the
raw material for some home manufacture.
In the mean time the demand for Hun-
tsman's steel steadily increased, and in 1770,
for the purpose of obtaining greater scope
for his operations, he removed to a large,
new manufactory which he erected at At-
tercliffe, a little to the north of Sheffield,
more conveniently situated for business pur-
poses. There he continued to flourish for
six years more, making steel and practicing
benevolence; for, like the Darbys and Rey-
noldses of Coalbrookdale, he was a worthy
and highly respected member of the Society
of Friends. He was well versed in the science
of his day and skilled in chemistry, which
doubtless proved of great advantage to him
in pursuing his experiments in metallurgy.†
That he was possessed of great perseverance
will be obvious from the difficulties he en-
countered and overcame in perfecting his
valuable invention. He was, however, like
many persons of strong original character,
eccentric in his habits and reserved in his
manner. The Royal Society wished to en-
roll him as a member, in acknowledgment
of the high merit of his discovery of cast
steel, as well as because of his skill in practical
chemistry; but as this would have
drawn him in some measure from his seclu-
sion, and was also, as he imagined, opposed
to the principles of the society to which he
belonged, he declined the honor. Mr. Hun-
tsman died in 1776, in his 72d year, and was
buried in the church-yard at Attercliffe,
where a gravestone with an inscription
marks his resting place.

His son continued to carry on the busi-
ness, and largely extended its operations.
The Huntsman mark became known through-
out the civilized world. Le Play, the French
professor of metallurgy, in his "Mémoire"
of 1846, still speaks of the cast steel bear-
ing the mark of "Huntsman and Marshall"
as the best that is made, and he adds:
"The buyer of this article, who pays a
higher price for it than for other sorts, is
not acting merely in the blind spirit of rou-
tine, but pays a logical and well-deserved
homage to all the material and moral quali-
ties of which the true Huntsman mark has
been the guarantee for a century."

The Lawrence Furnace Company, Col.
George N. Gray, trustee, paid its creditors
a dividend of 60 per cent. the other day. So
says the Ironstonian.

*Annales des Mines, Vols. III and IX, 4th Series.
†We are informed that a mirror is still pre-
served at Attercliffe, made by Huntsman in the
days of his early experiments.
‡Annales des Mines, Vol. IX, 4th Series, 266.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, March 20, 1879.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. EYLES, Editor.
JOHN S. KING, Business Manager.

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Thirty-fifth Page.—Boston and St. Louis. Hardware and Metal Prices.

It has been announced by telegraph, under date of the 14th instant, that Messrs. Bolckow, Vaughan & Co. have been successful in making steel from Cleveland pig iron. If verified, this will be of the utmost importance to that district, where the facilities for making cheap iron are exceptional, but which is unfortunately dependent upon ores containing a high percentage of phosphorus. A solution of the problem, which has been so carefully and intelligently studied in the Cleveland district, would be welcome news to many American iron-makers. It is generally known that Messrs. Bolckow, Vaughan & Co. have been constantly experimenting of late years, and it has been stated by English exchanges, as we noted in a recent issue of *The Iron Age*, that the process submitted to experimental test was that of Messrs. Thomas & Gilchrist, first tried at Blaenavon, later at Thy-Thy-Chateau, and still later at the Aclism Works. So far as can be gathered from published accounts, this process is based

upon the use of a magnesian limestone, suitably prepared as a lining for the Bessemer converter, and upon the effect of basic additions in eliminating phosphorus. What the precise conditions for success are, how far that success has been actually achieved experimentally, and whether the process used will stand the severe test of continuous work on a large scale, are questions which can only be answered after fuller information has been received than is likely to come by cable. The subject is one which has especial interest just now for the American iron trade, and we shall give our readers all the trustworthy information obtainable.

The Canadian Tariff.

On another page of this issue we give an abstract of the new tariff submitted last week to the Dominion Parliament, with extracts from the speech of Mr. Tilley, in which he makes certain references to the relations of Canada to the United States. As the copy of the text of the bill from which our abstract is made was in very bad shape and full of obvious errors, we are not quite sure that some of those not so obvious have not crept into our table. This is less important, however, than it would be if the bill had been revised. Its reception by Parliament seems to have been generally favorable, but when the "log rolling" begins and the members buckle down to the practical business of taking care of their constituencies, it is not improbable that the bill will be so changed and amended that its framers will have difficulty in recognizing it. In its present shape it is of little value beyond giving an indication of the views of the ministry, which may be supposed to reflect to some extent the demands of the delegations which have had hearings at Ottawa.

Examining the items, it appears that some effort has been made to carry out the principle of protecting manufacturers, while giving them the benefit of cheap raw materials. The difficulty here encountered is to say where the line between raw materials and manufactures shall be drawn. For example, pig iron is taxed 25 per cent. There is no protection in that figure against American competition. Blooms, billets, slabs and lumps are taxed 12½ per cent. *ad valorem*, while bar iron of all shapes and sizes, bands, hoops, sheets (black and galvanized), boiler plates, nail rods, &c., are taxed 17½ per cent. *ad valorem*. These are all the raw materials of certain important industries, but they are the finished products of other industries equally important. Consequently, we find them straddling the line about midway between the free list and the highest duties named. Wire rods are not protected at 10 per cent., nor are rails at 15 per cent. The duty on wire (25 per cent.) will probably make its manufacture profitable. So will the 25 per cent. duty on stoves and other finished castings. Duties ranging from 25 to 35 per cent. on such manufactures as scales, wood screws, bolts and nuts, hollow-ware, and builders' saddlers' and undertakers' hardware, are protective. Lead is taxed 10 per cent., and manufactures of lead from 20 to 25 per cent. Nearly all the more important manufactures of brass are taxed 10 per cent., but a rate of 30 per cent. is established for those "not otherwise specified." Machinery, except for bookbinders' and printers' use, is taxed 25 per cent. Steel, unmanufactured, is taxed 10 per cent., but most manufactures of steel are put in the 30 per cent. class. These items are sufficient to show the scheme of the bill, so far as it relates to the classes of products and manufactures of especial interest to our readers. The free list is pretty large, and will probably excite some opposition.

As a revenue measure, this bill, if passed in anything like its present shape, is likely to be a success, but we venture to predict that it will prove a disappointment as regards its effects upon the industrial prosperity of the Dominion. The people of the United States have no reason to quarrel with the people of Canada in this matter, since they are actuated mainly by a desire to imitate the policy of the American government, in the hope of effecting thereby an industrial development in some degree proportionate to that which protection effected in this country during the ten years from 1860 to 1870. It must be remembered, however, that while like causes produce like effects, they do so only under like conditions. The conditions which in this country favored the phenomenal development and diversification of industry during the period indicated, do not, and cannot, exist in Canada. She is not in any respect ready for a great industrial development. She has neither the capital nor the enterprise, and these will not be attracted to her cities and mining districts by the enactment of an experimental tariff which is not a political necessity—though it is the outgrowth of a political revolution—and which may not be permanent. If such a development is forced, it will be at the expense of other interests, notably the agricultural, which will be found a safer and more permanent dependence at present, and until her population shall have largely increased. That the enactment of a tariff designed to protect the manufacturers of the Dominion will seriously obstruct American trade with that country, cannot be denied. Whether it will ultimately benefit the Canadian consumer, as protection has benefited the

consumer in this country, is, at best, extremely doubtful. However, as we said before, this is their affair. Our manufacturers are not likely to sell out and go to farming in consequence of their action, nor is it probable we shall ever know how terrible a retribution our refusal to renew the reciprocity treaty has brought upon us. Canadian trade has been fairly profitable for some years past, and we have won in her markets a signal victory over British competition. Perhaps we shall not wholly lose the advantage we have gained, but if we should, it is some consolation to know that we shall probably be able to continue to pay interest on our national debt and make it pleasant for Canadian smugglers on our northern border.

The Movements of Freight over the Pennsylvania Railroad for 1878.

The reports which the Pennsylvania Railroad have issued during the past few years, have been worthy of careful study by every manufacturer of iron. As we have so often said, the transportation problem is one of the most serious with which the iron-maker has to deal, and any information as to the cost of transportation and the direction of the movements of freight are of the utmost importance to him, as indicating the charges necessary for carriage, and also any changes in the centers of trade. On these subjects the reports have been very full, and any one by a little study can gain from them some important facts. The cost of transportation we discussed in last week's issue. In this we shall study the report in relation to the amount of freight moved and its direction.

The Pennsylvania Railroad, with its leased lines, is the shortest between the great trade centers of the West and the cities of New York and Philadelphia. To the seaboard it is much the shortest of any of the trunk lines. On the other hand, it is so situated that it should have its fair share of the freight that moves westward for the seaboard. Another fact to be borne in mind in studying the tables is that the line, for a long distance, passes through a country that is dependent for its prosperity on the iron and coal trades which have been so seriously depressed, and any increase of freight, especially local, must be taken as an indication of returning prosperity in these trades.

The main tonnage tables are the following, which show the movement of tonnage and the mileage of the same over the lines east of Pittsburgh and Erie for 1878, as compared with the previous year:

TONNAGE MOVED OVER LINES EAST OF PITTSBURGH AND ERIE.

	1878.	1877.	Inc.	Dec.
Maine line and branches	10,946,752	9,738,995	1,207,757	.....
United railroads of New Jersey	3,840,330	3,964,593	124,263	.....
Phil. & Erie Railroad	2,810,466	2,681,430	129,036	.....
Delaware & Raritan Canal	1,521,530	2,023,443	498,913	.....
Totals	19,121,977	18,405,711	1,337,473	611,207
Net increase	.....	.....	716,566	.....

TONNAGE MILEAGE ON LINES EAST OF PITTSBURGH AND ERIE.

	1878.	1877.	Inc.	Dec.
Maine line and branches	1,733,003,131	1,494,798,198	238,204,933	.....
United R. R. of N. J.	255,097,095	256,134,099	1,107,004	.....
Phil. & Erie Railroad	181,900,802	335,727,141	153,826,339	.....
Del. & Rar. Canal	63,477,228	93,800,450	30,323,222	.....
Totals	2,433,607,656	2,180,459,888	253,147,768	.....
Net inc.	.....	.....	251,347,768	.....

The first fact which a study of these tables discloses is that not only the tonnage, but the tonnage mileage, has largely increased. The number of tons of freight moved in 1878 over the main line and branches, including 680,476 tons of fuel and other materials for the company's use, was 11,627,228 tons, embracing 5,007,811 tons of coal. For the previous year, 10,438,394 tons were moved, showing an increase of 1,188,834 tons, or about 11 4/10 per cent., while the increase in coal tonnage was 53,919 tons. An inspection of the tables shows that the average haul of each ton of freight moved over the main line was 159 miles in 1878, against 153 in 1877, a very small increase in detail, but an enormous one in the aggregate, and important as indicating a possibility of decreasing terminal expenses per ton of freight.

It appears from other portions of the report, that of the 10,946,752 tons of freight moved over the main line, 1,783,543 tons only were through freight, and 9,208,209 local. This would give an average haul on the local freight of over 100 miles. This is an important fact, as showing that the earnings depend much less on through traffic than upon local business which cannot be drawn away by competition, and which must be at its lowest point now, with the prospect that any change must be for the better.

One of the most important statements in this report not shown in the table, is that, as compared with 1871, there has been a large increase in through East-bound freights and a falling off in through West-bound. This is not only true of through freight, but of local as well. The East-bound local freights have increased and the West-bound local freights decreased. This is significant.

Telegraphic advices from various points of Pennsylvania report an alarming condition of affairs in that hitherto well-con-

ducted and orderly State. The following are examples:

READING, Pa., March 17.—It began raining here last night and continued until about noon to-day. All over the city can be noticed a strange yellowish deposit resembling sulphur, supposed to have come down with the rain. It has neither taste nor smell.

ALLENTOWN, Pa., March 17.—There was found this morning beneath the snow which fell last night a substance, in some places half an inch deep, strongly resembling sulphur. It has the same color and smell, and a quantity of it scraped together and set on fire burned as readily and emitted the same fumes as sulphur.

If we must have such displays of atmospheric foolishness, let us hope that in some future storm phosphorus will not be substituted for sulphur. The latter is had enough, in all conscience, but half an inch of phosphorus over the surface of the State, particularly in the iron-making districts, might prove very embarrassing. We have plenty as it is, and can well dispense with showers of this inconvenient element, but when nature makes a beginning in this direction, it would be difficult to predict what she will do next.

Since the foregoing was written we have received the reassuring intelligence that the supposed sulphur has been found to be pollen from "The Pines" of New Jersey. This is certainly very gratifying, and all who are interested in the iron business will be greatly relieved.

The Cost of Steel Rails.

The figures at which steel rails have been sold recently in England have caused much surprise, not alone in this country, but in iron circles in Great Britain. It seems a well-established fact that Messrs. Wilson, Cammell & Co., Dronfield, near Sheffield, made a tender, which was accepted, for 25,000 tons of Bessemer rails for the North Eastern Railway at either £4. 9/6 or £4. 9/-—say at the largest figure, \$21.48 per ton. This is only a fraction more than a ton of pig costs in this country, and not as much as the pig for a ton of rails costs at many works. Bolckow, Vaughan & Co., of Middlesbrough, tendered £4. 15/ and lost, of course. The latter firm are somewhat exercised over the loss of the order, as they believe they can make steel rails as cheaply as they can be made in England, and we have no doubt they are right; but their Sheffield competitors took the order.

To us in this country it seems well-nigh impossible that steel rails can be made at \$21.48, unless there are some economies in their manufacture which we have not yet learned. The Eston Works of Bolckow, Vaughan & Co. are admirably and economically managed. The pig is run from the blast furnace to the converter, and the converter and spiegel furnaces are so arranged as to save waste in runners. The arrangements in the mill are also productive of great economy; but how even there the cost of a ton of rails can be brought down to about \$22, is something we are quite unprepared to explain.

The recent statements of the French iron masters before the Commission on the Causes of Industrial Depression, throw some light on the question of cost of steel rails in Germany that are invaluable. M. Jordan, a director of the blast furnace company at Marseilles, stated that it was possible at Krupp's works to turn out a ton of Bessemer pig iron for 65f. @ 70f., and a ton of steel rails for 130f., first cost; or, at 19.3 cents to the franc, \$25.09. It is noteworthy, says the *Allgemeine Zeitung*, that the representative of Krupp's firm before the German Commission declined to give any information as to the cost of production. The other German rail manufacturers examined estimated their cost of production at 126 marks per ton, exclusive of general expenses. This would be \$30.25.

We do not know the cost of steel rails in this country, except in a general way, but \$40 seems to be the point below which they cannot be forced. They have gone to this figure several times, but we have not heard of any sales below it. This would indicate that at some mills, at least, the cost of manufacture must be near this point. We think it would be safe to say that from \$35 to \$42 might be taken to be the cost at the mills now in operation.

Great Britain's Exports of Coal and Metal Goods.

In the following table, compiled very carefully from official statistics not readily accessible in convenient form, we give the results of an attempt to determine to what countries Great Britain has of late been shipping important quantities of coal, iron, copper, lead, tin, machinery and hardware. To save space, we have reduced quantities to tons and values to thousands of dollars:

India.						
	1876.		1877.		1878.	
	Tons.	V. Inc.	Tons.	V. Inc.	Tons.	V. Inc.
Coal	759,835	2,284	895,963	4,472	678,065	1,765
Copper	487	307	741	284	1,417	508
Hardware	3,623	1,716	4,668	1,908	4,506	1,661
Bar iron.	1,407	.....	1,300	.....	1,390	1,090
Rails.	46,778	1,780	51,108	8,845	37,994	1,230
Hoops, &c.	51,267	2,259	305,285	34,310	104,219	3,518
Cast & w't iron	30,728	1,845	34,767	1,768	20,755	7,485
Lead	31,320	3,277	39,559	4,727	38,830	5,331
Iron	1,893	358	2,456	35	3,499	377
Mach'y	4,335	.....	5,500	.....	6,154	.....
Total	944,400	18,478	1,478,478	27,888	898,444	20,515

	Australia.	United States.
Hardware	2,843	2,793
Bar iron	2,242	2,746
Hoops, &c.	27,725	2,878
Rails	29,583	1,596
Cast & w't iron	39,630	3,770
Lead	2,009	240
Machinery	2,645	3,054
Total	120,270	14,927

	Australia.	United States.
Pig iron	41,640	837
Bar iron	9,579	141
Rails	374	13
Hoops, &c.	7,014	418
Wrought & cast iron	4,117	430
Tin plates	90,283	6,086
Steel	7,486	1,358
Lead	1,314	58
Machinery	1,084	9,904
Block tin	713	284
Total	155,456	14,930

	Australia.	United States.
Copper	2,031	830
Do. w't	537	273
Hardware	1,181	450
Pig iron	245,049	3,772
Bar iron	5,127	237
Rails	14,171	710
Hoops, &c.	12,332	1,348
Iron, w't & cast	21,844	1,373
Lead	1,280	148
Machinery	3,400	1,478
Block tin	499	186
Total	302,734	12,563

	Australia.	United States.
Cop. w't	1,286	554
Hardware	554	614
Iron & steel in bars	14,780	636
Rails	80,183	4,182
Hoops, &c.	12,036	721
Cast & w't iron	19,537	1,549
Lead	9,055	970
Machinery	4,121	2,490
Block tin	695	276
Total	143,514	13,395

	Australia.	United States.
Copper	5,155	1,130
Cop. w't	47	35
Hardware	700	40
Pig iron	95,133	1,340
Rails	3,031	278
Hoops, &c.	4,959	593
Cast & w't iron	2,961	611
Steel	3,313	2,854
Machinery	1,929	501
Block tin	1,929	501
Total	121,580	4,480

	Australia.	United States.
Hardware	814	837
Pig iron	24,431	21,077
Bar iron	22,504	881
Rails	61,095	2,666
Hoops, &c.	8,154	36,318
Cast & w't iron	11,367	861
Lead	220	517
Tin plates	220	517
Total	127,771	6,695

	Australia.	United States.
Hardware	1,286	554
Rails	29,583	1,596
Iron, cast and w't.	31,320	772
Total	53,728	9,926

	Australia.	United States.
Coal	545,337	1,619
Copper, w't	345	353
Rails	382	40
Machinery	434	1,003
Total	546,205	2,054

	Australia.	United States.
Rails	18,811	779
Machinery	1,535	799
Total	18,811	1,535

	Australia.	United States.
Lead	10,348	1,129
Coal	290,455	812
Copper, w't	834	380
Total	291,289	1,201

	Australia.	United States.
Iron, cast & wrought	8,406	931
Recapitulation 1876-1878.	.....	.....
India	\$6,781,000	.....
Australia	\$4,113,000	.....
United States	\$1,571,000	.....
Germany	\$3,492,000	.....
Russia	\$3,123,000	.....
France	\$2,051,000	.....
Italy	\$1,402,000	.....
Brazil	\$948,000	.....
Total	\$20,164,000	.....

From the above table it will be seen that eight of the countries named have taken machinery to the following amount:

Taking the three years together, Australia took the large amount of \$8,580,000 worth of hardware; India only about half as much, or \$4,296,000; Brazil, \$3,590,000. India took of machinery, \$15,989,000; Germany, \$11,761,000; Russia, \$11,259,000; Australia, \$9,145,000.

Mexico, Cuba and Porto Rico. We must also make allowance for habitual preference. English capital and English engineers are running nine-tenths of all the great mining, agricultural and industrial undertakings managed by foreigners in countries beyond the seas, and it is but natural, as well as more convenient financially, to go to England for the machinery needed. The only countries in which American capital and engineers predominate are, so far as is known to us, Cuba, the Sandwich Islands, Porto Rico and northern Mexico. By degrees our markets, so far as machinery is concerned, will expand, especially in the sugar-producing countries and the mining districts of Mexico and South America. In locomotives, pumps and hoisting machinery it has been shown that, even in the remote Pacific countries, we can successfully compete with England, Germany and France, and we shall, in all likelihood, make considerable headway there in the near future. In Brazil, Peru and Chili, our products in these classes of machinery have also a fair future.

As for hardware and cutlery, our chances of successful competition are vastly better, and there is no country we know of where we may not make trade and keep it. We cannot afford to sell our products on the terms of the English goods have been sold in times past; but the English will be less ready in the future to extend facilities to remote countries, late experience having shown what an excessive liberality in the matter of credits leads to. The experience gained during the past few years has been fruitful in benefit to those interested in developing our foreign trade in manufactures, and one of the most important of the many things our manufacturers have learned, is that we can compete on equal terms where we cannot, and will continue to do so; where we cannot, we will not for the present seriously attempt it.

The troubles among the coal miners of the Monongahela Valley above Pittsburgh continue. The strike in this valley has been in progress for over three months, but is now virtually ended. A large number of the miners have been at work for some time at the old rates, 2½ cents per bushel, and nearly all the pits were to resume on Monday. Last week nearly 1000 of the striking miners encamped near Elizabeth, and sent detachments to the different works in operation, to endeavor to induce the miners who had begun work to suspend operations. The old statements are made regarding the purposes of these crowds. "They are lawless," "abiding, quiet men," it is asserted, "who would not only discountenance any act of violence on the part of their fellows, but would, in the event of an outbreak, array themselves on the side of the law and assist the officers in suppressing acts of violence. The sole purpose of their meeting was to hold a friendly conference with the miners who were working for 2½ cents per bushel, with the hope of convincing the 'black sheep' that it would be to their interest to sustain the strike by standing out for 3 cents." The question arises, Why does it require a camp of 1000 men to hold a friendly conference with these miners, who are exercising their undoubted right to work for 2½ cents a bushel if they choose to? Whether this is a fair rate or not is a matter for the miners to decide for themselves. The trouble with such assemblies is that they too easily proceed to violence when talk fails. From friendly conference it is easy to pass to threats, and from threats to clubs and firearms. A camp of a thousand "law-abiding, quiet men," need little provocation to become a mob, and the provocation is not hard to find nor far from them. As we have before intimated, the authorities of Allegheny and neighboring counties are determined to prevent any illegal interference with the workmen in the pits.

We learn, through the kindness of Mr. Oscar W. Maddams, of Biga, that the Baltic Exhibition, to which attention was drawn in a former issue of *The Iron Age*, has been postponed until 1880, on account of the plague in Russia.

NEW PUBLICATIONS.

FIRST ANNUAL REPORT OF THE COMMISSIONER OF MINERAL STATISTICS OF THE STATE OF MICHIGAN. By Chas. E. Wright, Commissioner.

There seems to be of late a disposition on the part of State legislatures, for instance, those of Georgia and Alabama, to suspend the important work of studying local mineral resources and publishing the results. It is with pleasure, therefore, that we note the course of Michigan legislators, which has made the resumption of the work so ably conducted for many years by Major T. B. Brooks, possible. The appropriations for the work, it is true, do not seem to have been over liberal, and therefore it is creditable to the Commissioner, Mr. Wright, that he and those who have co-operated with him, have succeeded in accomplishing so much and doing it so thoroughly. We have in former issues of *The Iron Age* printed the statistics gathered and published by the commissioner, and will in the future give to our readers abstracts of the more important information embodied in the report which, as an introductory chapter, contains an essay on the geology of the Lake Superior iron region. Prof. Charles D. Lawton contributes a historical sketch of the iron region. Then follows a detailed description of the more prominent mines and openings of the region, with statistics of shipments, numerous sections, analyses, &c., constituting the body of the work. A second main portion is devoted to the Lake Superior cop-

per mining industry, its history, the geology of the region, and a description of the mines, with numerous data as to cost of working, &c. Smaller chapters are devoted to brown stone for building purposes, slates, gneiss, marble, gypsum and salt, the latter sketch being from the pen of Dr. S. S. Garrigue, State Salt Inspector. The work contains much important information, well arranged and therefore readily accessible. Its object, to be of practical value to all interested in the mineral resources of Michigan, has been well attained, and we hope that the general recognition of the value of the labors of the commissioner, may induce the State authorities to tender enlarged facilities for the accomplishment of the work still to be done.

TRANSACTIONS OF THE AMERICAN INSTITUTE OF MINING ENGINEERS. Vol. VI. May, 1877, to February, 1878.

It is natural that the growing importance of the American Institute of Mining Engineers—now one of the largest and most influential scientific associations of the United States—should reflect very favorably the character of the work performed under its auspices. It cannot and does not pretend to lead the progress of investigation and experiment, but it affords to all interested in metallurgy and mining an admirable means for the interchange of practical deductions, and a discussion of theoretical deductions, which are of incalculable benefit to every progressive and thoughtful engineer. With progressive and thoughtful papers submitted to it have been multiplied and diversified, so that each succeeding volume of transactions published by it has become a more important contribution to technical literature. Of the large number of the papers read, those of interest to the readers of *The Iron Age* have been printed in our columns, either in full or in the shape of careful abstracts, during or soon after the sessions at which they were read, as for instance, Mr. A. L. Holley's paper on the "Strength of Wrought Iron, as Affected by Its Composition and by Its Reduction in Rolling," Mr. T. F. Witherbee's "Fluxing Siliceous Iron Ores," Mr. John Birkinbine's "Notes upon the Drainage of a Flooded Ore Pit at Pine Grove Furnace," Mr. P. Barnes' "Notes upon the Construction of the Converting Works of the Edgar Thomson Steel Works," Mr. E. F. Loiseau's paper on the "Manufacture of Artificial Fuel at the Port Richmond," Mr. A. L. Holley's "Notes on the Iron Ore and Anthracite Coal of Rhode Island and Massachusetts," Prof. Eggleston's "Copper Mining on Lake Superior," Mr. John M. Hartman's paper on "Fire-brick Stoves for Blast Furnaces," and the valuable report of the committee on a standard wire gauge.

The volume now before us contains, besides these, a brilliant essay on "Hydraulic Mining," from the pen of Aug. J. Bowie, of San Francisco, who has presented the most complete description yet published of this peculiar American method of extracting gold from auriferous secondary deposits. Mr. Oswald Heinrich, a frequent and valued contributor to the transactions, has for the time being abandoned his accustomed field—bituminous coal mining—and gives in one paper an account of the prospects of the Goderich salt mine, and the difficulties encountered in sinking the shaft through a series of dangerous strata with the aid of iron tubing. He contributes also a long paper on the "Mesozoic Formation in Virginia," discussing it from a geological and economic point of view. Mr. Charles M. Rolker, of Reno, Nev., has a paper on the late operations of the Mariposa per on the late operations of the Geostat, and Prof. J. C. Smock, of the Geological Survey of New Jersey, contributes an essay on the fire-clays and kaolins of New Jersey, a more elaborate by the Survey account of which was published by the Survey, and noticed in *The Iron Age* at the time of its publication. Closely following one of our papers, we find Mr. B. Fernow's review of Mr. Kent's papers referring to the geological features of the Lake Superior copper districts, and the methods of mining and the cost—contributed by Prof. Eggleston, who has had exceptional facilities for studying the subject. A paper of high scientific merit is that of Prof. B. W. Frazier, of Bethlehem, Pa., on the "Mechanical Work Performed in Heating the Subject which has been of contributions on a subject which has given rise to one of the most famous expert discussions in the annals of American mining law, are those on the Eureka-Richmond deposits in Nevada, Messrs. W. S. Keyes, of San Francisco, and Dr. R. W. Raymond being the representatives of one side of the case, while Prof. Blake presented the other. "The Action of Currents of Spheres of Solids in Ascending Rest," by J. C. Bartlett, has a practical bearing upon the subject of coal-washing and ore concentration, which has of late years become so important a branch of American mining industry. Much valuable work has been done abroad in this matter, and therefore the large body of American engineers has great experience of European experiments, has great value. Mr. John C. F. Randolph's elaborate description of Kutsche's description of the famous Clausthal Dressing Works, will therefore be welcome to many. Prof. Persifer Frazier, of Philadelphia, has presented a "New Classification of Coals," and an essay on "The Missing Ores of Iron."

From this enumeration, which only shows the cream of the volume, it will be seen how many branches have received their share of thought and discussion, though it is a curious fact that in this year's volume. This representation is accidental, as in previous years steel absorbed much of the attention of the members of the Institute, and from the present indications it is probable that a large portion of the seventh volume will be devoted to the subject of the chemical and physical properties of steel rails.

We notice with pleasure that Dr. Brown, the accomplished Secretary of the Institute, has added a complete index, not only of the titles themselves, but of the topics discussed. This will greatly facilitate reference and make the volume more valuable. We congratulate the Institute on the volume before us, and on its prospects for the future.

The Proposed Canadian Tariff.

Extracts from the Bill Prepared by the Finance Minister.

We find in the Ottawa journals the text of the proposed tariff bill, as submitted to the Dominion Parliament on the 13th inst. The arrangement of the items appears to be simply alphabetical, and we have had to pick out those of interest to our readers and arrange them in as good order as possible to facilitate reference. We are compelled to our abstract with the customary qualification of "errors and omissions excepted," as we have not yet received an official copy of the text of the bill. The following are the items we find relating to matters which most directly concern our readers:

Bells—For churches.....free
Broken, and bell metal, broken, fit only for remanufacture.....free

Brass.

Bars, bolts and sheets.....10%
Old and scrap.....10%
Wire, round or flat.....10%
Tubing, seamless, drawn.....10%
Tubing, plain, seamless, unfinished.....10%
Manufactures of, not elsewhere specified.....10%
Bullion—Gold and silver.....free
Burrheads—In blocks, rough or unmanufactured and not bound up into millstones.....25%
Carriages, wagons, sleighs and wheelbarrows.....25%
Hubs, spokes, felloes.....50%
Coal—Anthracite, per ton of 2000 lbs.....50%
Bituminous.....50%

Copper.

Figgs, rods, bolts, ingots, sheets and sheeting, not polished or coated.....10%
Tubing, seamless, drawn.....10%
Wire, round or flat.....10%
Rivets and bolts, not elsewhere specified.....30%
Manufactures of, not elsewhere specified.....30%
Old and scrap.....20%
Nails for sheathing.....20%
Precipitate, crude.....free

Explosives.

Gunpowder, in kegs, half kegs and quarter kegs, per lb.....50%
Cannon and musket powder, in kegs, per lb.....50%
Canister powder, per lb.....50%
Blasting and mining powder, per lb.....50%
Giant powder, dynamite, duoline, per lb.....50%
Ad valorem.....20%
Nitro-glycerine, per lb., 10c, ad valorem.....20%

Glass and Manufactures of.

Bottles, pressed, of all kinds.....30%
Carboys and demijohns.....30%
Fruit jars.....30%
Lamps and chimneys, lantern globes, lamp and gas shades.....30%
Insulators.....30%
Manufactures not specified.....30%

Iron and Manufactures of.

Fig, per ton.....12½%
Slabs, blooms, lumps, billets, flats, rounds and squares, rolled or hammered, drawn, smooth or polished, coated or galvanized, common or black boiler and other plate, Canada or foreign, not otherwise specified.....17½%
Round wire rods in coils, ½ inch diameter and less.....15%
Rails.....15%
Fish plates, frogs, frog points, chairs and fish girders.....17½%
Wire, iron or steel, No. 16 gauge or under.....25%
Castings, rough.....25%
Stoves and other finished castings.....25%
Car wheels.....25%
Forgings for mills or locomotives weighing 35 pounds or more.....25%
Mill iron, mill cranks.....25%
Locomotive engines.....25%
Locomotive tires, of steel or Bessemer, rough or smooth.....25%
Masts and wire rigging for ships, chain cables, over ½ inch in diameter.....5%
Scales, balances and weighing beams.....35%
Wood screws, iron or steel.....30%
French nails.....30%
Bolts, nuts, washers and rivets.....30%
Bedsteads and other iron furniture.....30%
Cast-iron hollow ware, tinned, glazed or enameled.....25%
Hardware for builders, cabinet makers, carriage makers, sandlers, upholsterers and undertakers.....10%
Boiler tubing, seamless drawn.....10%
Horse shoes and horse nails.....10%
Tacks and brads.....10%
Nails and spikes, cut, ½ cent per lb. and ad valorem.....10%
Lorems.....10%
Nails and spikes, wrought and pressed, galvanized and black, ½ cent per lb. and ad valorem.....10%
Firearms, muskets, pistols, rifles, &c.....20%
Old iron and scrap, per ton.....20%

Lead.

Figgs, blocks and bars, sheet, old and scrap.....10%
Pipe.....10%
Manufactures not specified.....25%

Machinery.

Bookbinders' ruling machines.....15%
Steam engines and boilers, and other machinery of iron of which iron is the component chief value, including machinery for cotton and woolen mills.....25%
Printing presses of all kinds.....15%

Steel and Manufactures of.

Ingots, bars, coils and sheets.....10%
Shovels, spades, hoes, forks, rakes and rake teeth.....30%
Carpenters' and cooper's tools.....15%
Bookbinders' tools.....30%
Axes.....30%
Scythes, saws.....30%
Skates.....20%
Cutlery and other manufactures of steel not otherwise specified.....20%
Knife blades.....10%

Tin and Manufactures of.

Blocks, tins and bars.....10%
Plates and manufactures of.....25%
Tinware, stamped and japanned.....25%
Type—New.....free
Old.....10%
Melted.....10%

Miscellaneous.

Agricultural implements not elsewhere specified.....25%
Brick.....30%
Electro-plated and gilt ware.....20%
Fire-brick.....free
Fire-clay.....free
Gas, coal oil or kerosene fixtures, complete or parts.....30%
Grindstones in the rough, per ton of 13 cu. ft. \$1.50
Metallic oxides, not calcined.....free
Mica and mica waste.....free
Mineralogical specimens.....free
Models of inventions not fitted for use.....free
Philosophical instruments and apparatus for schools and colleges.....free
Phosphor-bronze, blocks, bars, sheets and wire.....10%
Plumbago.....25%
Putty.....free
Quicksilver.....25%
Railway cars.....25%

Sand and emery paper.....20%
Tar and pitch.....10%

In presenting this bill, Mr. Tilley, Finance Minister, made a voluminous speech, in which its features were discussed at great length. We cannot spare space for this effort, which would fill several pages of *The Iron Age*, but have selected a few passages which relate to matters more or less directly connected with American trade. Some of Mr. Tilley's statements will be read with amazement by intelligent business men.

Without entering into a discussion here of the question of free trade and the United States, we may fairly conclude that the prosperity of the one country at this moment is dependent in a large measure on the other upon surplus and the depression in the other upon its deficiency. (Hear, hear.) Under these circumstances it appears to me that the best should turn our attention to the volume of our means of reducing the world. But before I touch that subject, let me refer to some other circumstances which have led to the present depression and the war in the United States that country lost a large portion of its export trade, and its manufacturing industries became, to a certain extent, paralyzed, and it was only about 1872 or 1873 that they really commenced in earnest to restore their manufactures, and to endeavor to find an extended market for those manufactures. We, lying as we do alongside of that great country, were looked upon as a desirable market for their surplus products, and our American neighbors, always com- petent to judge of that matter, put every effort to act wisely in that matter, put every effort to obtain access to our market. It is well known by the term "slaughter market," what they have been doing in the last four or five years in Canada. It is well known that in order to find an outlet for their manufactures, they have been willing to send them into this country at any price to be a little below what they can produce. (Hear, hear.) It is well known that they have had their agents in every part of this Dominion seeking purchasers for their surplus goods. That these agents have been enabled under our existing tariff to enter their goods in the Dominion of Canada, at a price much less than cost, when they ought to have paid the duty on the value of the articles in the market in which they were purchased. It is well known that the Government of the United States, in order to encourage certain industries in that country, granted a bounty to certain manufacturers to enable them to enjoy the market the exclusive market, I may say, of the Dominion of Canada. (Hear, hear.) That under these circumstances we have lost a very important trade that we had before 1873—the direct West India trade. It is well known, as I stated at the outset, that the direct trade in tea, with all the advantages connected with it, from this country to New York and Boston. (Hear, hear.) It is well known that, under all these circumstances, with a high duty imposed on the agricultural products of Canada, by which we are, to a great extent, excluded from the markets of the United States, and from the manufactures of that country forced into our markets, and at such prices that we could not expect success in this Dominion of Canada so long as that continued. (Hear, hear.) These are some of the difficulties which have led to our present state of affairs. After having made to call the attention of that head I desire to call the attention of the House to the remedy. I know that it is a difficult question. I know that it is the opinion of some honorable members in this House that, no matter what proposition you may make, no matter what legislation you may introduce, you cannot improve or increase the prosperity of the country. I entertain a different opinion. (Cheers.) I may say, at the outset, that it would have been much more agreeable if the Government had met the House in such a position that it was not necessary to ask for increased taxation. In the imposition of duties we are now about to ask, it may be said, that we are asking, and will receive, that from the imports from the United States, a larger portion of the two millions we require than we will take from the mother country. We may be charged with this, I believe, such will be the fact, but, I think, in making such a statement before this House, forming, as we do, a part of that great country which receives our natural products without any taxation, a country that receives everything we duties whatever without imposing any duties whatever upon them. Apart from our national feeling and national considerations, I think that this House will not object if in the proposition before us we take a larger amount of the \$2,000,000 out of our American neighbors than we do out of England. (Cheers.) Mr. Chairman, I have this to say to our American friends. In 1865 they abrogated the Reciprocity treaty; from that day to the present a large portion of that country the Dominion of Canada from that country have been admitted free. We have hoped, but hoped in vain, that by the adoption of that policy, we would lead our American friends to treat us with reference to these articles in a more liberal spirit than they have. (Hear, hear.) Well, sir, after having waited twelve years for the consideration of this subject, and requiring more revenue, the government have determined to ask this House to impose upon the products of the United States, that have been free, such a duty as may seem consistent with our position. (Cheers.) But the government couple with it, in order to show that we approach this question with no unfriendly spirit, a resolution that will be laid upon the table of this House, with the propositions for introducing a duty on these articles, a resolution that are national products of this country, as the United States take off, in part or in whole, the duty they impose, we are prepared to meet them. (Cheers.) Sir, the government believes in a reciprocity of tariffs. We may discuss free trade or protection as we please, but the

question to-day is, Shall we have a reciprocity of tariff, or shall we have a one-sided tariff? (Cheers.)

We found that it was important to encourage the export of our manufactures to foreign countries, and we are prepared now to give to every manufacturer in the Dominion of Canada a drawback upon the duties he may pay upon goods used in manufactures of the Dominion exported out of it. We found also that, since the fixed systems of some foreign countries, our sugar refining trade, and other interests, were injuriously affected. The Government had decided to ask the House to impose countervailing duties upon that article. (Cheers.) I trust that this proposition will receive the support of both sides of the House, because, some six months since, a deputation of sugar refiners in London waited upon Mr. Gladstone, and also upon Sir Stafford Northcote, and both of those gentlemen, representing free-trade views, and not exactly protectionist views, but at the same time the views of the Government, declared—I remember well the emphatic terms used by Mr. Gladstone—himself a free trader; that, when a government came in and interfered with the legitimate trade of the country, he, free trader though he was, thought it desirable to impose countervailing duties. (Cheers.) To place this matter beyond dispute the Government propose to ask the House for authority to collect from all such articles the ad valorem duty on the value, irrespective of the drawback. (Cheers.) It is the remedy which we propose.

An honorable member of the government desires me to explain that if, for instance, 1½ cents a pound of drawback is put on cut nails imported into Canada, the duty would be collected on the value of the nails, irrespective of that drawback. If a bounty is given on sugar in excess of all that is paid by the sugar refiner, the government will exact the value of that sugar, irrespective of the drawback. I may also state another reason why the government think our American neighbors should not object to the imposition of the duties we propose, and it is this: It is a fact, though not generally known, that the average percentage of duty imposed on all imports into Canada at present, taking the returns of last year as a criterion, is 13½ per cent. The amount of duty collected last year on the imports of Great Britain is a fraction under 17½ per cent, while the amount of duty collected on imports from the United States is a fraction under 10 per cent. (Cheers.) I think our friends across the border, if they will not give us a reciprocity treaty again, cannot object to the imposition of the proposed duties, though they should fall a little heavier on their articles which come into competition with ours. The amount of imports entering into consumption from Great Britain in 1877-78, \$37,431,000; in 1873-74, \$6,076,000, being a difference of nearly double. The imports from the United States in 1877-78 were \$48,232,000, and in 1873-74, \$54,000,000, a slight falling off.

In considering this question of the tariff and protection to our industries, the government considered how they could best discharge their duty to the Dominion, and how they could best accomplish the object the country desired from us. We might obtain \$2,000,000 by the imposition of duties upon certain articles, and appear to give protection but give no protection; we might obtain a revenue from increased duties, but not place it in such a position as to give real encouragement and protection to the industries they desire to protect; and, therefore, in arriving at the propositions and conclusions I am about to submit to the House, we submit them in the full conviction that they will be effectual in their character, and will give protection to all who have the right to ask and expect it.

The next class of articles we come to is pig iron. (Hear, hear.) In considering this question, Mr. Chairman, the government need to take into consideration how far the proposed duty would develop the important iron interests of the Dominion. It is quite true that a very large deposit of iron is found, and no doubt will be found where it is not yet known to exist in Nova Scotia. Adjacent to it are large beds of coal, and for the Province of Ontario no doubt this interest is a very important one, but it is not confined to Nova Scotia. We found, on an examination of geological reports, and the reports of officials who have been entrusted with this particular branch of our institutions, that in every Province of the Dominion there are large deposits of iron, and from the West we have had specimens of iron submitted to us of the most valuable character—iron that can be molded, almost in a crude state, into any shape that you desire by the application of heat from petroleum, which appears to remove some of the difficulties that have been experienced in producing the phosphorus as much as it removes the phosphorus and sulphur which rendered that iron almost valueless before. If there are large deposits, as no doubt there are, from the information we have received from the West, of petroleum, we may reasonably expect that in the Western part of our Dominion, as well as in Nova Scotia, here, in the valley of the Ottawa, where we have some of the finest iron in the Dominion, as well as in Quebec and New Brunswick, where we have iron which is not surpassed by any part of the Dominion, by giving some encouragement to this manufacture this interest will spring up and produce the same beneficial result we find in every country, no matter what country it is, England, for instance, France, or as I said, in every country that has arisen to any position at all, the iron test is one of the most important interests of that country. (Hear, hear.) It is true that we have not developed it to a very large extent here, as we have but one furnace, or rather establishment, in operation, which will only produce about one-sixth of our present requirement, and there is no reason why we should not produce the whole of it in time. There is great diversity of opinion as to the amount of duty to be levied, but as an experiment we propose \$2 per ton on pig iron. For the tariff on iron see schedule.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, March 19, 1879.

During the past week the financial markets have been active and generally strong. The local money market has been especially firm, and rates on call loans have advanced to 6 per cent. As will be seen from the table of the aggregate averages of the national banks, printed below, the reserve shows a decline to \$3,840,000, which is the least amount of reserve held at this season for many years. This reduction is due to the transference from the banks to the Treasury of the amount received by the government in payment for the 4 per cent. bonds, and it is likely to embarrass general business, for the reason that the banks will have to meet a demand for \$3,000,000 to \$5,000,000, in the shape of accommodations to aid the banks of the country districts in effecting the April settlements. It is evident that the immediate future of the money market depends in a great degree upon the action of the Secretary of the Treasury, and it is gratifying to know that he stands pledged to so use the influence of his department as to avert the danger of stringency with attendant embarrassment to general business.

The market for government bonds is steady. Since our last writing about \$10,000,000 of 4 per cents. have been sold and an equal amount of 5-20s called for redemption. This swells the total sales of 4 per cents. since the beginning of the year to \$270,000,000. We give below the closing quotations of government bonds.

Investment shares are steady and desirable railway mortgages strong. In the stock market there has been much irregularity in speculative stocks, which have been generally lower. The principal dealings have been in the stocks most active for some time past. We give below the closing quotations of shares on the active list.

The bank return shows a decrease of \$370,750 in surplus reserve, which now stands at \$3,844,975, against \$16,100,825 at this time last year, and \$12,235,525 at the corresponding period in 1877. The loans show a decrease this week of \$1,349,700; the specie is up \$367,200; the legal tenders are decreased \$1,420,400; the deposits other than United States are down \$2,729,800, and the circulation is increased \$99,200.

The following is an analysis of the bank totals of this week compared with that of last week:

	March 8.	March 15.	Comparisons.
Loans.....	\$247,674,200	\$246,324,500	Dec. \$1,349,700
Specie.....	16,945,200	13,319,400	Dec. 3,625,800
Legal tenders.....	4,503,800	39,173,400	Dec. 1,420,400
Total reserve.....	22,913,800	65,816,300	Dec. 1,933,200
Deposits.....	113,293,100	110,563,300	Dec. 2,729,800
Reserve required.....	33,923,975	34,640,825	Dec. 624,450
Surplus.....	4,215,725	3,644,975	Dec. 570,750
Circulation.....	19,236,000	19,335,200	Inc. 99,200

The foreign trade movements at the port of New York since our last issue are shown in the following tables:

For the week ended March 15:

	1877.	1878.	1879.
General goods.....	\$2,087,600	\$1,894,838	\$2,730,551
General mfrs.....	5,458,961	4,881,186	4,336,266

Total for week..... \$7,546,561
Prev. reported..... \$6,776,024
Since Jan. 1..... \$68,849,724

Included in the imports were items of merchandise valued as follows:

	Quantity.	Value.
Anvils.....	598	\$4,644
Brass goods.....	30	2,901
Bronzes.....	10	1,158
China and ankers.....	16	477
Copper.....	172	172
Cutlery.....	48,762	48,762
Guns.....	13	4,655
Hardware.....	1,214	1,214
Iron, sheet, tons.....	203	203
Iron, ore, tons.....	36,321	36,321
Lead, pigs.....	2,400	2,400
Metal goods.....	22,959	22,959
Needles.....	7,557	7,557
Nickel.....	321	321
Old metal.....	558	558
Paints.....	3,046	3,046
Perforation caps.....	333	333
Saddlery.....	4	4
Silverware.....	1,851	1,851
Tin, boxes.....	4	4
Tin, 679 slabs.....	33,812	33,812
Wire.....	6,427	6,427
Zinc.....	144,645	144,645

EXPORTS, EXCLUSIVE OF SPECIE.

For the week ended March 13:

	1877.	1878.	1879.
For the week.....	\$4,794,472	\$4,874,374	\$5,020,575
Prev. reported.....	51,925,530	67,034,911	60,093,817

Since Jan. 1..... \$56,700,002
Prev. reported..... \$75,187,785
\$56,994,322

EXPORTS OF SPECIE.

For the week ended March 15:

	1877.	1878.	1879.
Total for week.....	\$376,559	\$376,559	\$376,559
Previously reported.....	3,950,438	3,950,438	3,950,438

Total since January 1, 1879..... \$3,950,438

Government bonds at the close were quoted as follows:

	Bid.	Asked.
U. S. Currency 6's.....	121 1/2	122
U. S. 6's 1881 reg.....	105 1/2	106
U. S. 6's 1881 coupon.....	106 1/2	107
U. S. 6's 1882 reg.....	106 1/2	107
U. S. 6's 1882 coupon.....	106 1/2	107
U. S. 6's 1883 reg.....	106 1/2	107
U. S. 6's 1883 coupon.....	106 1/2	107
U. S. 6's 1884 reg.....	106 1/2	107
U. S. 6's 1884 coupon.....	106 1/2	107
U. S. 6's 1885 reg.....	106 1/2	107
U. S. 6's 1885 coupon.....	106 1/2	107
U. S. 6's 1886 reg.....	106 1/2	107
U. S. 6's 1886 coupon.....	106 1/2	107
U. S. 6's 1887 reg.....	106 1/2	107
U. S. 6's 1887 coupon.....	106 1/2	107
U. S. 6's 1888 reg.....	106 1/2	107
U. S. 6's 1888 coupon.....	106 1/2	107
U. S. 6's 1889 reg.....	106 1/2	107
U. S. 6's 1889 coupon.....	106 1/2	107
U. S. 6's 1890 reg.....	106 1/2	107
U. S. 6's 1890 coupon.....	106 1/2	107

The following were the closing quotations of active shares:

	Bid.	Asked.
American District Telegraph.....	47 1/2	48
Atlantic and Pacific Telegraph.....	37	38
Canada Southern.....	60 1/2	61
Chicago and Northwest.....	35 1/2	36
Chicago and Rock Island.....	130	131
Chicago, Bur. and Quincy.....	113 1/2	114

Col., Chic. and Ind. Central.....	3 1/2	3 3/4
Clev. Col. and Ind.....	40	41
Chicago and Alton.....	79	80
..... Pref.....	108	109
Canton.....	27	28
Delaware, Lack. and Western.....	47 1/2	48
Delaware and Hudson Canal.....	40 1/2	41
Express-Adams.....	105 1/2	106
..... American.....	49	50
..... United States.....	49 1/2	50
..... Wells, Fargo & Co.....	100 1/2	101
Erie.....	24 1/2	25
Erie preferred.....	43 1/2	44
Harlem.....	43 1/2	44
Hannibal and St. Joseph.....	15 1/2	16
..... Pref.....	43 1/2	44
Illinois Central.....	43 1/2	44
Kansas Pacific.....	80 1/2	81
Kansas and Texas.....	9	10
Lake Shore.....	70 1/2	71
Michigan Central.....	80 1/2	81
Morris and Essex.....	8 1/2	9
Milwaukee and St. Paul.....	80 1/2	81
..... Pref.....	80 1/2	81
New York Central.....	114 1/2	115
New Jersey Central.....	37 1/2	38
Ohio and Mississippi.....	37 1/2	38
Pacific Mail.....	12 1/2	13
Pennsylvania.....	12 1/2	13
Pittsburgh and Fort Wayne.....	12 1/2	13
Quicksilver.....	12 1/2	13
..... Preferred.....	35	36
St. Louis and Iron Mountain.....	15 1/2	16
St. Louis, Kansas City North.....	15 1/2	16
..... Pref.....	37 1/2	38
St. Louis & San Francisco.....	6 1/2	7
Union Pacific.....	8 1/2	9
Western Union Telegraph.....	73 1/2	74
Wabash.....	19	20

GENERAL HARDWARE.

The week under review has been a very busy one, and the general report is that both manufacturers and wholesale dealers are fully employed. In some lines of goods we notice a decided improvement as regards prices. Tinware, for instance, owing to the recent advances on plates, is now firmer than has been the case in a long time, while the amount of goods being sold is larger than it has been at this season in many years. The General Hardware business so far this year has been continuous, increasing steadily in volume, and in this particular is in pleasant contrast to the spurring character of the trade last year.

The American Screw Company have issued, under date of 14th instant, a reduced and revised price list of Gimlet-Pointed Coach Screws, which will be found below. They have also issued the following circular:

PROVIDENCE, March 14, 1879.
GENTLEMEN: We desire to call your attention to our reduced and revised price list of Gimlet-Pointed Coach Screws, and to advise you that for lengths six inches and shorter our price will be by the one hundred, instead of by the pound, as heretofore.

We also would ask your attention to our being prepared to meet a popular demand for these Coach Screws, in packages of one hundred, fifty, or twenty-five of a kind, according to size, and hope to be favored with your orders, which shall have our prompt attention.

Withdrawing and canceling all previous quotations and terms on Coach Screws, we now quote:

Coach Screws.
6 inches and shorter—In packages of 100 or less, price list per 100, less 6 per cent. discount.
6 inches and shorter—In kegs of 100 lbs., price list per 100, less 7 per cent. discount.
6 1/2 inches and longer—Price list per lb., less 7 per cent. discount.

Terms, cash thirty days. Freight prepaid to New York, Boston, Philadelphia and Baltimore. To other cities, freight is not prepaid, but rates of freight will not exceed rates from New York City. Soliciting your valued favors, we remain, very respectfully,
AMERICAN SCREW CO.

Revised Price List, March 14, 1879, of the American Screw Company's Gimlet-Pointed Coach Screws. Price per Hundred.

Length	1/4	3/8	1/2	5/8	3/4	7/8	1
1 1/2	2.30	2.70	3.10	3.50	4.00	4.50	5.00
2	2.40	2.80	3.20	3.60	4.10	4.60	5.10
2 1/2	2.50	2.90	3.30	3.70	4.20	4.70	5.20
3	2.60	3.00	3.40	3.80	4.30	4.80	5.30
3 1/2	2.70	3.10	3.50	3.90	4.40	4.90	5.40
4	2.80	3.20	3.60	4.00	4.50	5.00	5.50
4 1/2	2.90	3.30	3.70	4.10	4.60	5.10	5.60
5	3.00	3.40	3.80	4.20	4.70	5.20	5.70
5 1/2	3.10	3.50	3.90	4.30	4.80	5.30	5.80
6	3.20	3.60	4.00	4.40	4.90	5.40	5.90

Price per Pound.

Length	1/4	3/8	1/2	5/8	3/4	7/8	1
1 1/2	2.30	2.70	3.10	3.50	4.00	4.50	5.00
2	2.40	2.80	3.20	3.60	4.10	4.60	5.10
2 1/2	2.50	2.90	3.30	3.70	4.20	4.70	5.20
3	2.60	3.00	3.40	3.80	4.30	4.80	5.30
3 1/2	2.70	3.10	3.50	3.90	4.40	4.90	5.40
4	2.80	3.20	3.60	4.00	4.50	5.00	5.50
4 1/2	2.90	3.30	3.70	4.10	4.60	5.10	5.60
5	3.00	3.40	3.80	4.20	4.70	5.20	5.70
5 1/2	3.10	3.50	3.90	4.30	4.80	5.30	5.80
6	3.20	3.60	4.00	4.40	4.90	5.40	5.90

PROVIDENCE, March 14, 1879.

GENTLEMEN: We desire to call your special attention to the memorandum of Gimlet-Pointed Coach Screws herewith, and any that may be unsold when your orders are received we will sell at the following very low prices:

Price list per 100 of date March 14, 1879, less 70 and 25 per cent. discount. Terms, cash, 30 days, f. o. b. Providence.

These Screws offered are a surplus of stock, and the quantity named is positively all that will be sold at above reduced price. We trust the very low price will be an inducement for you to buy the 9-16th in place of 1/2 inch or 3/4 inch, and soliciting your orders, we remain, yours respectfully,
AMERICAN SCREW COMPANY.

GENTLEMEN: To the large amount of machinery for manufacturing our regular standard sizes of Machine Screws, we have made recent additions of special machinery for making screws to pattern, and solicit your orders for small as well as large quantities, to be furnished at as low prices as the cost will warrant. We are prepared to furnish Set and Cap Screws, Studs, &c., at Manufacturers' prices. Parties using Machine Screws of any kind in notably large quantities, are requested to inform us of their requirements and give us an opportunity of quoting prices. We shall endeavor to make it to their interest to favor us with their orders. Our standard Machine Screws

and Taps are kept in stock and for sale by the Hardware trade in principal cities and towns, and orders are solicited either direct or through them. Yours, very respectfully,
AMERICAN SCREW COMPANY.

At the meeting of Window Glass manufacturers, which was in session in this city when we last wrote to press, the following price list was adopted, to take effect from the date of its adoption, March 12. The trade here quote discount 75 per cent. for both Single and Double:

AMERICAN WINDOW GLASS.
Price Current Per Box 50 Feet.

Single.	Double.
1st. 2d. 3d. 4th.	1st. 2d. 3d. 4th.
6x8 to 10x14.....	8.25 7.50 7.00 6.50
11x14 to 15x24.....	9.25 8.50 8.00 7.50
16x24 to 20x34.....	10.25 9.50 9.00 8.50
21x34 to 25x44.....	11.25 10.50 10.00 9.50
26x44 to 30x54.....	12.25 11.50 11.00 10.50
31x54 to 35x64.....	13.25 12.50 12.00 11.50
36x64 to 40x74.....	14.25 13.50 13.00 12.50
41x74 to 45x84.....	15.25 14.50 14.00 13.50
46x84 to 50x94.....	16.25 15.50 15.00 14.50
51x94 to 55x104.....	17.25 16.50 16.00 15.50
56x104 to 60x114.....	18.25 17.50 17.00 16.50
61x114 to 65x124.....	19.25 18.50 18.00 17.50
66x124 to 70x134.....	20.25 19.50 19.00 18.50
71x134 to 75x144.....	21.25 20.50 20.00 19.50
76x144 to 80x154.....	22.25 21.50 21.00 20.50
81x154 to 85x164.....	23.25 22.50 22.00 21.50
86x164 to 90x174.....	24.25 23.50 23.00 22.50
91x174 to 95x184.....	25.25 24.50 24.00 23.50
96x184 to 100x194.....	26.25 25.50 25.00 24.50

Sizes above—\$20 per box extra for every five inches. An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 32 inches in length, and not making more than 32 united inches, will be charged in the 32 united inches bracket.

The manufacturers of Stair Rods have issued a uniform price list, which is subject to discount 33 1/2 per cent. We print below that portion of the list, containing the regular goods with which the Hardware trade are familiar:

REVISED PRICE LIST OF STAIR RODS.
March 1, 1879.

Add for Nickel Plating \$2.50 per doz. to List.

th, in.	21	22	24	26	27	28	30	32	33	36	40
in....	80	85	95	105	110	115	125	...	...	...	...
".....	90	95	105	115	120	125	135	...	...	...	...
".....	117	123	134	145	151	157	168	180	190	205	225
".....	...	...	145	155	160	165	175	185	195	210	240
".....	...	...	170	180	188	200	224	240	250	272	304

Old Rails.—The market remains in the more obstinate condition as reported during the last two months. Prices refuse to advance, and a decline seems to be equally well resisted. A decline of \$1 to \$1.50 in Pittsburgh has had no effect here so far, and sales during the past few days have been at \$21 to \$21.50 for spot lots. The market is still bare of stock, but it is impossible to indicate what the course of the market will be a few days hence. As anticipated some time ago, we may again repeat that at \$20 to \$20.50, all offerings appear to be absorbed, but beyond \$21 there is no parent demand, although, as stated, sales

there are no longer and more general complaints than I have hitherto heard. It had been hoped that with the inauguration of the Parliamentary session (which alone is the direct cause of the influx of over 600 M. P.'s and 400 peers, besides hundreds of officials, county families, wire pullers, and others to town) there would have been a very decided accession to business. Those who were sanguine on this head, however, have been sorely disappointed, for the shopkeeping classes complain that there has been no such dull period for half a century. The "great ones of the earth"—the jocks, earls, and so on—are not festively disposed, or if such be their inclination they are marvellously successful in restraining their desires. Some little spurt may result from the forthcoming marriage of the Duke of Connaught and Princess Louise of Prussia, but so far as present indications serve to show, it will not be notable. Presently the Queen goes to Italy—whereat the West End trades people grumble intensely. They allege there is no Court worthy of the name nowadays, with the Queen always absent from London, either in the Isle of Wight or in her much-beloved Scotland. The Prince and Princess of Wales, it is true, hold levees and

drawing-rooms on behalf of Her Majesty, but there is not that go and come which our West End folk would like to see. Thus, my republican friends may perceive, royalty has its commercial uses, and may largely support commerce provided it goes about things in regal fashion. So far as London is concerned there is not the slightest doubt on this head. All that immense area generically styled the "West End" is inhabited by wealthy persons drawn from all parts of the civilized world, and the majority, at all events, devout worshippers of fashion. If the King or Queen is given to gaiety, so necessarily is the Court. What the upper ten does is imitated by those immediately outside that charmed circle. Brown follows Smith; Jones swears by Brown; Robinson hurries close up, and so on *ad infinitum*. Thus as I have stated, it really does make a vast difference to the trade of the country, for not only is the direct influence of London most weighty within its own confines, but it extends by rapid waves all over the country. When times are good the London tradesmen are large buyers of cutlery, plated and gilt wares, cabinet case goods, all sorts of hardwares, bronzes, jewelry and a host of minutiae. The city deals with the whole world; the West End is the great shopping emporium for the whole of Great Britain. When Farmer Chawbacon comes to Lunnun to sell his beasts at Smithfield Market, he is under strict injunctions to take back the missus and bairns summat nice—which he mostly does as a solution for the deprivation suffered by the family during his absence. Half the country people come to the metropolis for their annual holidays, and spend here what must be in the aggregate a vast sum of money. When times are bad they don't come, or, if so, spend but little. All these circumstances go to show that London may be taken as the index of this country, and prove that when business is dull here it cannot well be bright elsewhere. One of the bitterest sources of annoyance to the shopkeepers here is the

CO-OPERATIVE STORES MOVEMENT,

especially as developed in the cases of the establishments fostered by various classes of Civil Service employees. These concerns have grown from humble beginnings into enormous palaces, employing hundreds of assistants and each turning over millions of money yearly. The principal stores are the Army and Navy, the Civil Service, New Civil Service, and London and Westminster. At their doors long strings of carriages may be seen the livelong day. Peers and wealthy commoners throng for the place of service before the counter, and chaffer for the "best terms" like the merest hucksters. Every customer must make out his or her own bill and present it with the order for the goods. No credit is given, and in some cases no change, hence there is no book-keeping and no risk of making bad debts. All small packages must be taken away by the purchaser, or if delivered are charged extra. Orders for £2 and over are delivered free within a radius of four miles, or £5 to a distance of 100 miles. As I write I have before me the latest price list of the Army and Navy Co-operative Society (Limited), shareholders in which must be officers serving, or who have served, in the army, navy, militia, or yeomanry, or their widows, sons, or daughters. Subscribers must be introduced by some of those just named. The committee of directors includes two admirals, three generals, a major and two captains, besides another major and a third captain as "managing directors." The price list is a thick volume (374 pages), handsomely got up, and containing within its covers everything anybody can possibly need—ranging from jewelry and precious stones down to blacking and toothpicks. "Any article not in stock"—a locomotive, 81-ton gun or so—"can be had at a few days' notice." On looking over the hardware, ironmongery, &c., lists I find prices quoted which are 10 to 25 per cent. below the figures of the ordinary retailer—and that difference prevails, I am told, in every other department. Such being the case, it is no subject for especial wonder that the stores are monopolizing business here, or that they attract a large and increasing share of custom from the provinces. They sell the best goods, and only pay by having a tremendous turnover at moderate profits. The shopkeepers grumble and threaten all sorts of impossible things. Their only remedy, however, is to abolish credit and so fight the co-operatives on their own ground. On that platform it ought to be long odds on the shopkeeper, who surely must know more about his specific business than a large general organization. The shopkeeper, if a live tradesman, must possess that knowledge which will enable him to buy more advantageously than the stores—apart from the favorable circumstance (for him) that the stores are only supplied *sub rosa* by many manufacturers, whereas he is in no way hampered, but has all the advantages which free and open competition can give him. At present matters are in a state of transition, and the stores have the retailers at their mercy, but there are signs and tokens of a coming change, the full fruition of which will probably bring victory to the side of the "legitimate" traders.

SCOTCH PIG IRON

has been a little stronger, and more business has been done in warrants at 43/5 to 44/1 ton. Shipments are also on an improved scale. There are 89 furnaces in blast in Scotland, against 85 this date last year, and 217,116 tons in Connal's stores, against 170,416 tons. Shipments to date show an increase of 9342 tons, about equally divided between foreign and coastwise consignments. Ballast pig is again 40/ ton along-side ship. Messrs. William Colvin & Co. report a better market, and James Watson & Co. (Glasgow, Feb. 28) said: "The Scotch iron market has been active since the date of our last, with a more cheerful feeling and a large business done. On Monday transactions took place from 43/5 to 43/6 1/2, cash, and on the following day the market was strong, with business done up to 43/11 1/2 ton. On Wednesday the price further improved to 44/1 1/2, cash, with a good demand. Yesterday the market opened dull at 43/9, recovering, however, in the afternoon to 44/1, cash, while to-day the tone has been firm, business being done up

to 44/1 1/2, cash, in 10 days, closing sellers at 44/1 1/2, prompt; buyers at 44/1 ton. Shipments last week were 8996 tons, as compared with 5124 tons for the corresponding week of 1878. We quote:

	No. 1.	No. 2.
G. M. B. at Glasgow	43/6	42/6
Gartsherrie	43/6	42/6
Coltness	43/6	42/6
Summerlee	43/6	42/6
Langloan	43/6	42/6
Carbros	43/6	42/6
Calder, at Port Dundas	43/6	42/6
Glenarnock, at Ardrossan	43/6	42/6
Eglinton	43/6	42/6
Dalmellington	43/6	42/6
Shotts, at Leith	43/6	42/6

IN CLEVELAND

the stocks of pig iron are also heavy, although several of the producers report themselves as being rather busier, probably in preparation for the opening of the Baltic and northern navigation for the season. The founders are doing a little more, but it is for the most part in respect of a low class of work. Head, Wrightson & Co. have secured an order from the East Indian railways for 5000 tons of cast iron chairs, and the Anderson Foundry Co. one for 700 tons, on behalf of the Bombay, Baroda and Central Indian Co. In both instances prices are low—scarcely over £2. 5/ a ton. In the steel rail branch of Northern industries most interest centers in the statement that Bolckow, Vaughan & Co. have secured orders amounting in the aggregate to nearly 50,000 tons for India, Italy and New Zealand, after a fierce competition with home and German manufacturers. The prices at which these good orders have been taken have not transpired in print, but I think I do not violate anybody's confidence when I state that £4. 8/6 to £4. 10/ f. o. b. Middlesbrough and London is "within a mile" of the average figures.

SHEFFIELD

once more sends forth a Jeremiad, this time to the effect that the fund for the relief of the distressed is exhausted, without there being any real diminution in the number of those who still clamor for relief. An urgent appeal has, therefore, been made for additional help, which the Mayor and the municipal authorities earnestly beg for without delay. The principal trades of the town and district do not improve in the slightest degree, and those who should be best qualified to speak authoritatively on the subject, confess that they can see no symptoms of any forthcoming alteration in the right direction. It is thus fully apparent that Sheffield is in a bad way and that, so far, the year 1879 has not brought about that amendment of its industrial state which has been so long and so vainly looked forward to. It would be of little use to allude in detail to the trades of the locality—suffice it to say that all, with scarcely one exception, are stagnant beyond all precedent. The lighter branches, it is true, have what little advantage there is, which is not much. Some of the better known cutlery houses report themselves to be fairly well engaged, but even they cannot secure that amount of profit which their turnover ought to command. Joseph Rodgers & Sons (Limited) claim exemption from this general indictment, for they have just paid their "usual" dividend of 17 1/2 per cent—like Tennyson's Brook they "go on for ever"—at 17 1/2 per cent.

STAFFORDSHIRE AND BIRMINGHAM

as regards iron are quiet, indeed one may say they are quite lethargic, inasmuch as the whole of South Staffordshire now only boasts of 24 active blast furnaces out of 150 built! "Oh! what a fall is there, my masters!" Probably in time even South Staffordshire will awake to the conviction that progress and improvement are stern necessities for her, if she wishes to avoid being "wiped off the slate." In respect of general hardware there is more business in course of execution, and in Birmingham especially, a very marked change for the better in patterns, processes, and the quality of finished work. Your brass foundry goods are said to be quite unable to compete with ours, and your "Copper Ring" is scarcely likely to give you increased advantages as regards the selling prices of such goods. Iron tube houses report that they are doing a fair business with the United States via Canada. Is that true—and if so, to what extent? Bearing in mind Mr. Geo. Westinghouse's letters last year to the *Ironmonger*, I am inclined to have doubts about the verity of the statement. Perhaps you may be better informed!

SOUTH WALES AND MONMOUTHSHIRE

are a trifle steadier, two or three of the larger establishments being rather better employed. Ebbw Vale has taken an order for a Spanish line for 3000 tons rails at £5. 10/ per ton f. o. b. at Gijon. Dowla is running an order for India and South America, as well as some lots for the Great Western Company. From Cardiff, last week, 440 tons of rails were shipped to Valencia, by Davis, Fry & Co., and 50 tons of sheet were sent to Antwerp by Booker & Co. From Newport the outward consignments included 1879 tons of rails and other railway iron.

TIN PLATES

are firmer in the Swansea district, which is the center of that important industry. The Cookley Company, whose works are near the Kidderminster, have advanced their charcoal plates by 2/ a box, and other producers are following suit. The enhanced price of tin is made the plea for this rise, but I suspect that this is a mere excuse for pushing forward with the upward movement inaugurated some time ago. The Liverpool dealers are beginning to grumble at these renewed impositions, but I do not see how they can very well avoid or resist any change the makers think fit to make.

THE METAL MARKETS

have been well upheld in most respects, but the business done has not been extensive. The *Ironmonger* reports as under: "Copper has been steady at £54. 10/ to £55 for spot G. O. B.; £63. 10/ to £64, Wallaroo; £60 to £60. 10/; English tough, £60. 10/ to £61. 10/; best selected; and £66 for strong sheets. At the Swansea ticketing on Tuesday 1017 tons of Bett's Cove and Union were sold at 9/8 1/2 for 9% product. On Wednesday 340 tons of Cape ore sold by tender at about 10/3 1/2 unit, for 32% product. Tin opened firm

at £61 to £61. 51/ for fine Foreign on spot, and £64 to £65 for English ingots, the Cornish smelters having advanced standards £2. The metal has remained steady throughout. There have been imported from Amsterdam 300 slabs in the Pilot. Tin plates are still strong, and there is so good a demand that some of the producers have put up prices 1/6 to 2/ per box. The Liverpool and other exporters have hitherto been passively satisfied with the upward course of these goods, but any further change in the same direction would probably excite much dissatisfaction, or even tend to a rigid limitation of the wants of consumers. In the United States, the American Tin Plate Company are making strenuous efforts to secure a portion of the trade arising in that country. Lead is without any change of importance, at £13. 5/ to £13. 10/ for ordinary English pigs, and £13. 2/6 for soft Spanish, without silver. Spelter is £15. 10/ to £15. 15/ for ordinary English. Of Zinc, 40 tons have gone off at auction at £19. 7/6, and 75 tons at £19. 10/. Quicksilver is £6. 5/ per bottle, and Antimony £46 to £47."

The Official Report of the London Metal Exchange was: Copper firm at £54. 15/ to £55 for G. O. B. Chili bars, spot, and named brands £55. 5/ to £55. 10/; Wallaroo, £63. 10/ to £64; Burra, £63 to £63. 10/; English tough, £59 to £60; selected, £60. 10/ to £61; strong sheets, £65 to £66. Tin—lower; fine foreign on the spot, £63. 10/ to £63. 15/; and forward, £63. 10/ to £63. 15/; English ingots, £67 to £68. Iron—Scotch pigs steady; 43/10 1/2 cash. Lead—Finner: £13. 7/6 to £13. 10/ for English pig; Soft Spanish, without silver, £13. 5/; Spelter—£15. 10/ for ordinary brands. Zinc—No quotations. Quicksilver—£6. 5/. Antimony—£46 to £47.

FOREIGN.

FRANCE.

(Moniteur des Interets Matérial.)

PARIS, Feb. 28, 1879.—Metals.—Business is still a good deal unsettled. This is to some extent due to the uncertain aspect of political and economical affairs, and to a certain degree to the length and severity of a long winter season hampering the revival of trade in many directions. This metal has remained very quiet all along, first brands Chili bars giving way to francs the 100 kilos, and Ingots, 2.50. We now quote first brands Chili Bars, deliverable at Havre, 151.50; Common ditto, 147.50; Ingots and Slabs, 147.50 to 150; Best Selected, 157.50; pure Corcoro Ore, 155; Sheathing, 180; and Yellow Metal ditto, 170. Havre is not so quiet as Paris. We quote the latter 100 kilos, first brands Chili Bars, good current, 146.25 to 147.50; and Lota, 145 to 146.25. Refined Ingots have declined 5 francs at Marseilles, where small refined Ingots are worth 150 francs; Sheet Copper, 177.50; Bolts, 187.50; Sheathing, 180; and Yellow Metal ditto, 170. Tin.—A fresh decline has taken place of 2.50 francs in Billiton, 1.50 in Banca, and 1.75 in English in this market. The following are the latest quotations: Banca, deliverable at Havre or Paris, 166.50 francs the 100 kilos; Billiton, 161.50; Straits and Australian, 161.50; and 158.50 for English at Havre or Rouen. Marseilles is 2.50 francs lower with Banca, and 1 franc with English. They now quote Banca, 165; Straits, 160; French, 165; and English, 167. Lead on the spot is again cheaper in the Paris market, there being a decline of 1.25 francs in all sorts. We quote the latter 34.50 francs the 100 kilos, at Havre and 35 at Paris. At Havre, Spanish is steady at 38 to 38.25 francs the 100 kilos. At Marseilles several transactions in Spanish. "Figueras" brand took place at 34.50 francs. Of other Spanish brands sales have been made there at 32 francs. We hear that 500 tons of Lead have been shipped from Spain to the United States. Manufacturers of Lead command at Marseilles 38 francs. Spelter.—Although this metal is weak enough here, no actual decline has taken place. We quote Silesian at Havre, 42.50, and 43 at Paris. Vieille Montagne and Royal Asturian Sheet, 60; Blanche St. Waast, 58. Havre quotes Silesian, 42.50 francs the 100 kilos, lower at Marseilles; the same Silesian; they quote the same 53.50, and other brands, 53; Old Remelted, 50 francs the 100 kilos. Iron.—During the past few weeks there was a steady decline in the Paris market, but this has since then an attempt has been made to force off some large lots at a notable shading, and this has again unsettled everything. Merchant Iron "De la Seine" No. 2 having sold at 16 francs. Some 1700 tons of English have been taken for these last few days. The telegraph lines under adjudication at prices not very remunerative to the makers. In the Leve district the Pont-Eveque Foundry has blown out its blast furnace, and declares that for the current year it will be unable to pay any dividends on interest or capital. This explains the recent decline in its shares in anticipation of this inevitable resolution. The outlook in the Haute-Marne district is a decidedly improved one, orders are dropping in and extend to pretty much every article in the iron line there produced. In the Northern department a general rise has taken place in the prices of all sorts of iron, and at anything below 14.50 francs, and do not engage to deliver beyond May 31. Even forges of medium size are in receipt of 4000 ton orders. The Domain d'Azain forges have declared their first dividend since 1874. Prospects are bright for the coming year in the Rhone and Loire district. The Southern Railroad has ordered 40 locomotives at the Creusot Works. The demand for Sheet Iron has been reduced to a minimum, and they are now only looking for the Coal trade for the moment; the demand from the interior is quite dull, especially the glass works are a disappointment, several of them having ceased operations of late.

BELGIUM.

(Revue Universelle.)

BRUSSELS, Feb. 27, 1879.—Iron.—The outlook in Belgium is far from being a hopeful one. Most of our works are getting on from hand to mouth, and whenever some of them succeed in obtaining a government order, the profits on such contracts are meagre. The government has been making having hinted that in view of the contemplated reposition of a duty on iron in Germany and the raising of the duties in other Continental countries, it may be necessary to protect the blast furnace industry of Belgium, and through retaliation exact better conditions from countries about to adopt a higher tariff. Manufacturers have expressed their dissent from these ideas, and given it as their opinion that it will be more advisable to defer all action in this sense for the present. Meanwhile Belgian makers will endeavor to push their dealings with remote countries in Europe, East and West, and will no doubt meet with the good success they have hitherto had in competing in those localities with the English, Germans and French—the more so as profits at home have been reduced to a minimum, and they are thus resigned not to miss a business abroad however slender the remuneration may appear. At all events, so far as Belgium is concerned, the first two months have sufficed to show that we are not in the eve of any genuine revival, and that our ironmasters, in order to keep their heads above water during the remainder of the year, will have to display an unusual amount of enterprise in their dealings with foreign countries in defiance of a satisfactory home trade. Prices meanwhile are generally weak.

GERMANY.

(Dorrenshalle.)

HAMBURG, Feb. 28, 1879.—Metals.—Iron.—The attitude of the German iron market is an expectant one. In the Rhenish Provinces of Prussia, Luxembourg Pig Iron sells at 34 to 36 marks; Charcoal Pig at 75 to 82; Bar Iron at 110 to 115; Sheet Iron at 160 to 170; ditto for Cauldrons, 175 to 180 per ton at the works. Metals.—Although we cannot announce a positive improvement in any one metal the tone prevailing is if anything a better feeling in general business. Spring is now drawing near, and with its advent more hopeful

views obtain. The questions affecting the tariff now to be solved by legislation will, in a month or two, be out of the way, and there will then be no obstacle to a resumption of activity in all branches. Stocks in the interior being moderate, not to say light, and prices certainly low enough, we expect a good run of trade beginning with the middle of next month and continuing into the summer months till the usual dullness sets in. Copper remains steady at 57 to 63 marks the 50 kilos. Lead is firmer at 14.50 to 18.75 marks. Spelter begins to attract more attention at 10.75 to 17.50 marks. The only metal still forming an exception is Tin, which is unusually dull, but seems to be worthy the attention of buyers, and is likely soon to look up again. We quote Banca 65 marks the 50 kilos.

HOLLAND.

(Kook & Vlierboom.)

ROTTERDAM, March 4, 1879.—Tin.—There has been an increased speculative demand for futures, but toward the close the excitement has abated somewhat. Banca rose from 38 guilders the 50 kilos, to a thence to 39.25. Billiton has been done at 37.50, from which figure it improved to 39, and closes at 38.50. Stock on warrants in the hands of the Netherlands Trading Society, 83,666 slabs Banca on the 28 inst., and 234, Billiton, against 51,274 Banca and 239, Billiton in 1878. Deliveries, 8400 Banca and 1417 Billiton in February, against 11,205 Banca and 1864 slabs Billiton in 1878; total since January 1, 14,952 Banca and 1417 Billiton, against 19,223 Banca and 1864 Billiton in 1878. Afloat from Banca by sailing vessels only, 13,325 piculs, against 4200 in 1878. The deliveries of Billiton Tin from first private hands have been 8693 slabs in February, and since January 1, 12,113 slabs. Stock, 61,248; afloat, 34,000 slabs.

AUSTRIA.

(Austrian Trade Journal.)

VIENNA, Feb. 28, 1879.—Iron.—A better feeling at length seems to manifest itself in general business circles. It is true we are as yet unable to report a notable rise in value in any one article, including Iron, but that confidence has seriously commenced to revive is, nevertheless, undeniable. The decline has been arrested, and various articles have slightly improved. We quote Austrian, Styrian and Carinthian Bar Iron on the spot here, 115 to 128 florins per ton; Hungarian ditto, 110 to 115; Sheet for locksmiths' use, 170 to 180; Beams, 135 to 150; Charcoal Pig, 45 to 48, and Coke ditto, 32 to 36.

SPAIN.

("Le Linca.")

LINARES, Feb. 28, 1879.—Lead.—The decline in the value of Lead continues unchecked, and it is believed that Lead ore will be obtainable here at an equivalent of £12 per ton. There is not one mine in the district that will be able to go on producing at such ruinous prices unless they possess argentiferous ores so very rich that they need not mind so much the value of the base metal. In November, 1876, Spanish Lead still commanded £21. 15/ to £22. 2/6 in the London market; last December it was down to £21 to £21. 2/6, and it now barely fetches £13. 5/ to £13. 15/.

CHINA.

(Arnhold, Karberg & Co.)

CANTON, Jan. 31, 1879.—Coal.—At the commencement of the fortnight very little activity was displayed, and beyond the purchase of the cargo per Yueno, at £7, nothing was done during the week. Since then, however, the exceedingly small quantity of Cardiff Coal on the way to this port and the low prices ruling here, have attracted attention, and under a steady order of 400 tons Cardiff and 400 tons Australian have been purchased as they lie in Godown. On the operation becoming known the market at once hardened, and two cargoes of Australian in harbor were bought by consumers at an advance of 50 cents upon recent settlements. For a cargo of 500 tons Cardiff, also in harbor, £9.75 has been paid, and at last we seem to be on the eve of a decided improvement.

EAST INDIES.

(Gillilan, Wood & Co.)

SINGAPORE, Feb. 1, 1879.—Tin.—The market slowly advanced to \$48.50 per picul, which was paid for 60 tons early in the week. Since then there has been an active demand for the United States, and about 200 tons have been settled at \$48.50 to \$49.50 per picul, and at the close there are buyers offering \$52 to 53 per picul. The shipments to the United States have been 67 tons during the past fortnight per steamers via London, and 10 tons by rail to New York, and to Boston 50 tons have been shipped by sea. "Finnegans"—The number of disengaged vessels has been much reduced and there is more demand; so far, however, no advance in rates has been established, but we think we are not far off improvement. For New York, the Charles Leining has been cleared; also the Wilhelm Anton. On the berth the only vessel is the Gardner Colby, which is still open to engage a cargo on the basis of 15/ for lead weight. For Boston, the Kate Carmie has cleared; the latter took 300 piculs Tin. Exchange after advancing to 3/6 1/2 has declined, and closes at 3/8 1/2 for six months' sight credit drafts on London.

The Return of the Paris Exhibits.

Our attention having been called to the fact that the brief note printed in our last issue respecting the return of the Paris exhibits was somewhat ambiguous, we have endeavored to obtain more explicit information. Upon inquiry at the office of Mr. McCormick, late Commissioner General of the United States at the Paris Exhibition, we learn that most of the articles remaining unsold or not otherwise disposed of, will be due at the port of New York in a few days, probably next week. Two of the vessels laden with returned exhibits—the United States storehouse Supply and the Trimountain—left Havre en route for home some time in January, and are now in port. They will unload at Martin & Fay's storehouses in Brooklyn, just below Fulton Ferry, to discharge.

It was believed at first that the Supply could take the whole, but when it was found that she lacked capacity, the Constitution was detailed to assist, and still 300 tons remained, which were put on the Trimountain, chartered for the purpose from Owen, Jones & Co., of New York. The Constitution is delayed by injuries received in a storm in the Bay of Biscay, and is repairing at Lisbon. She has the remainder of the goods for New York and all those for Philadelphia. All exhibitors will be informed by circulars what ship has their goods, exactly what to do to get them, and when the ship will discharge. Exhibitors will be responsible for all charges on their goods after they are landed on the pier. The Constitution has 1040 packages, the Supply 669 and the Trimountain 414. The Trimountain began discharging cargo yesterday; the Supply will begin next Monday, and the goods will be allowed to remain on the covered wharf for forty-eight hours, at the expiration of which time, if they have not been claimed and removed, they will be stored in the bonded warehouse of Martin & Fay, at the risk and expense of the owners. The charges for storage will be 30 cents for the first, and 15 cents for any succeeding month per package not exceeding 40 cubic feet in size and 500 pounds in weight, and for packages exceeding these dimensions, a proportional increase. When the goods have been stored the Commissioner General will relinquish all care of them, and communications in reference to the disposal to be made of them must be addressed to

Messrs. Martin & Fay, 97 Wall street, New York. At the end of twelve months, if the goods have not been removed, they will be sold by the storekeeper to pay charges.

From the foregoing it will be seen that all the Paris exhibits, except those for delivery at Philadelphia and the few remaining for New York delivery on the Constitution, are now at the disposal of the owners. Among the 1040 packages detained on the Constitution, we find the following in the official list:

	No. of cases.
Albright, A. Newark, N. J.	1
Allen, R. A. & Co., New York	1
Brown, A. F., New York	1
Brucher, T. W.	1
Bickford, Hoffman, Macdon, N. Y.	1
Brewster & Co., New York	1
Bailey, L. & Co., Hartford, Conn.	1
Brooks, Ezra	1
Blake, Wm. P., New Haven, Conn.	1
Blake Crusher Co.	10
Cumming & Lockwood	1
Curtis, H. H.	1
Oheebrough Mfg. Co.	8
Deere & Co.	1
Douglas, W. & B.	1
Darling, Brown & Sharpe	1
Hines & Gunn	1
Day, Austin G.	1
Dodge, Alfred	1
Eagle Mining & Machine Co.	1
Eagleton & Debnur	1
Farrel & Sherman	1
Fairchild, L. W. & Co.	1
Fairbanks, E. T. & Co.	50
Globe Mill Co.	2
Green, D. A.	1
Gatling Gun Co., Hartford, Conn.	1
Howe Scale Co., Rutland, Vt.	1
Hoyt, J. B. & Co.	1
Heim, Anton	1
Hines & Gunn	1
Johnston Harvester Co., Brockport, N. Y.	1
Jewel, P. & Sons, Hartford, Conn.	1
Kemble, Mrs. M. J.	1
Lovegrove & Co.	1
Lobell Car Wheel Co., Wilmington	1
Matthews, John	1
Nason Mfg. Co.	1
Nathan & Dryfus	1
National Car Spring Co.	1
Oregon State Commission	1
Osborn, C. S. & Co., Newark	1
Olt & Brewer, Trenton, N. Y.	1
Olmiestad, L. H.	1
Oscillating Pump Co.	1
Pullman P. E. Co., Chicago	1
Providence Tool Co.	1
Pickering, T. R. & Co., Portland, Conn.	1
Rubber Step Mfg. Co.	1
Reading Hardware Co.	1
Remington, E. & Sons, Ill.	1
Russell & Erwin Mfg. Co.	1
Russell, Lieut.	1
Sarony, N.	1
Snell Mfg. Co., Flakdale, Mass.	1
Seth Thomas Clock Co.	1
Smith & Egge Mfg. Co., Bridgeport, Conn.	1
Stearns, N.	1
Schlesinger, L. & Co.	1
State Department, Washington, D. C.	1
Spaulding Wagon Co., Moline, Ill.	1
Schultz, Southwick & Co.	1
Sweeney, A. J.	1
Stevens Patent Vise Co.	1
Spencer, Charles E., Columbia College	1
Tilden & Co.	1
U. S. Dep't of Agriculture, Washington, D. C.	1
Victor Sewing Machine Co.	1
Warden, Mitchell & Co.	1
Wood, Walter A.	1
Wiley & Russell Mfg. Co., Greenfield, Mass.	1
Watersbury Button Co.	1
Woolworth & Graham	1

All applications for the delivery of goods must be accompanied by the invoices.

Labor and Wages.

The trial of the 77 coal miners who were arrested for riot at Neel's coal works, Washington County, Pa., is in progress. The testimony so far given shows that on the 11th of February a large body of miners appeared at Neel's mines, armed with clubs, knuckles and other weapons, and, going into the pits with whoops and yells, they dragged out the miners who were working there and compelled them to quit.

The Right Rev. Bishop Gilmour, of Cleveland, has issued a pastoral letter to the clergy of his diocese, in which he condemns labor unions, on the ground that they are secret societies, and as such are not tolerated by the church.

The coal miners of Clifton, W. Va., struck for 10 cents advance. A compromise was effected, and the men resumed work. Three of the leaders of the strike were subsequently discharged, and another strike occurred, in consequence of a refusal to reinstate the three men. Afterward about twenty-five men determined to resume work, which they did. Miners from West Columbia, Camden and New Castle, to the number of about 200, came upon the works during the forenoon and compelled the men to cease. A meeting of the miners Monday afternoon resolved to stand out until the three men were reinstated.

New Jersey has determined to retain the prison labor contract system. The bill for its abolition, which obtained a large majority in the lower branch of the Legislature, has been defeated in the Senate. The coal miners at New Pittsburgh, Kan., and at Warrior, Ala., are reported to be on strike.

Protection for German Manufacturers Against American Competition.

LONDON, March 19.—The Post's Berlin dispatch says the Tariff Commission seems particularly anxious to secure German industry against American competition. It has proposed heavy duties upon most of the articles now imported from America. Its last decision is in favor of a duty of twenty marks per hundred weight on leather goods. It is now considering a proposal to tax foreign rags. A proposed duty on woolen yarns, however, has provoked the opposition of the German wool spinners. The protectionists are now attacking the present coinage system, and recommend the issue of plenty of paper money.

A dispatch from Cohoes, N. Y., dated March 18th, says: The death of William H. Weed, which occurred in New York on Monday afternoon, will in no way interfere with the running of the extensive edge tool works of the Weed & Baker Manufacturing Co., of this city.

A new style of steam motor is on trial on the Market Street (Philadelphia) Railway. It is the invention of L. T. Pyott, formerly of the pattern shop of Baldwin's Locomotive Works. It is entirely separate from the car containing passengers, and is in shape like an ordinary car cut in two. The boiler is an upright tubular, and the engine direct-acting high pressure. The fuel employed is anthracite coal.

Foot Power Bracket Saws

Are now so much in demand that some of them are being sold in almost every town in the United States. Many dealers are doing a profitable Christmas trade on such goods at a time of the year when other business is usually dull. The two Saws shown in these cuts are the ones most in demand. We advertise them as for sale at the hardware stores, and they will be called for. We make a fair discount to the trade.

LESTER SAW.



Lester Saw.

The New LESTER SAW is made of iron, with all the working parts of Steel, and contains ALL KNOWN IMPROVEMENTS to this date. It is handily painted red and green with red stripes, and presents a beautiful appearance. Those parts which are not painted are either polished or japanned. We warrant the Saw to be just as herein stated, and we know it will give entire satisfaction, being a more expensive machine than those which we formerly sold for \$25. It consists of a SCROLL SAW, with Tilt Table for inlaid work; arms 18 inches in the clear; clamps which will hold saws of any length or width, and face them in four different directions, cutting lumber from 1-16th to 1 inch in thickness; speed, 100 strokes per minute. 2d. A CIRCULAR SAW 24 inches in diameter, which will cut lumber 1/2 inch and less; with an Iron Table 4 by 5 inches. 3d. A DRILLING ATTACHMENT with six stubs' Steel Drills of various sizes for wood or iron work. 4th. An EASY WHEEL, with wide and narrow rim. 5th. A TURNING LATHE, with Iron Ways and Rest, Steel Centres and three Best Steel Turning Tools; length of Ways, 15 inches; distance between Centres, 9 inches; swing, 3 inches; length of Slide Rest, 2 1/2 inches; number of revolutions per minute, 700. Also, with each Machine, six Saw Blades, a Wrench, Screw Driver, Extra Belt and two sheets of Designs, with a nice box for the small tools and a box for the whole machine. It is taken apart when shipped and packed in a box, but the working parts are all left in place and the frame is put together again by a single bolt.

Price for everything above named, \$8.00
The same without the Lathe and Circular Saw, \$6.00
When desired, we furnish with the Lathe a very nice Drill Chuck for working metal, and a Tail Stock, with Screw Centre, for \$2.00 extra.

NEW ROGERS SAW.

This Saw is made entirely of Iron and Steel, except the Arms and Pitman. It is the latest improved 3/4 machine in market, having the Scroll Saw with Tilt Table and Drilling Attachment in common with other machines; and in addition a Dust Blower, Saw Strainer, connecting the back end of the arms, and Clamps made adjustable in every way, so that the Saw can be set with perfect accuracy and strained to any required tension. Right of the Table above the floor, 24 inches; Diameter of Balance Wheel, 12 inches; Diameter of Belt Wheel, 12 inches; Length of Arms in the Cleave, 18 inches.

Price, \$3.

MILLERS FALLS CO., 74 Chambers St., New York.

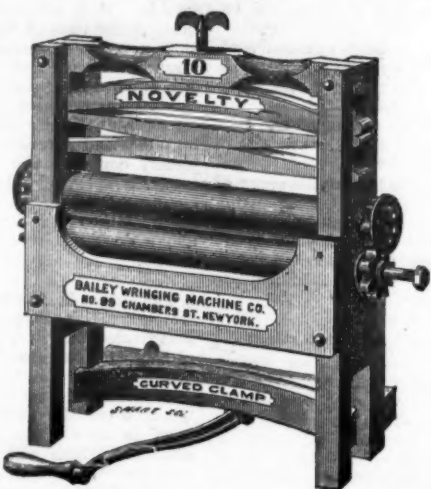


New Rogers Saw.

BAILEY WRINGING MACHINE CO.,

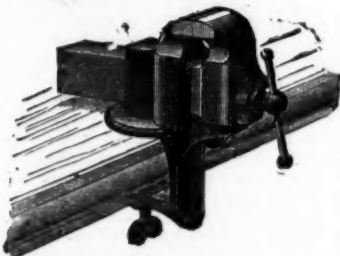
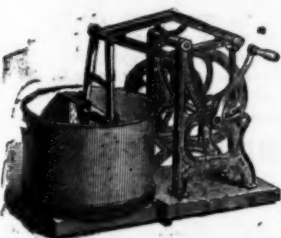
No. 99 Chambers Street, New York.

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Novelty and Excellence Clothes Wringers, Novelty and Excellence Carpet Sweepers.

Defiance Metallic Planes, Spoke Shaves, Try Squares, Box Scrapers, &c., &c.



SPECIAL QUOTATIONS ON THE ABOVE GOODS FOR EXPORT.
Send for Illustrated Price List and Discount Sheet.



ESTABLISHED 1850.
WM. HASSALL,
Manufacturer of
American and French
Wire Nails
With Flat, Round, Oval, Depressed, Screw
Fancy Heads, etc.

Brass Hooks for Jewelers' Cases, Zinc and Iron Hinges, Turn Buttons, Thumb Springs, Book Clasps, and Fancy Metal Work of all kinds.
OFFICE AND WORKS: Nos. 63 & 65 Elizabeth Street, New York.

Q. S. BACKUS,

Sole Manufacturer of the

BACKUS

Patent

Bit Braces,

Angular

Borers,

Ratchet

and

Straight

Extensions,

&c.



Comprising every grade of quality and finish, from the cheapest Farmers' Brace to the finest Steel Sweep, heavily nickel plated, with rose-wood handles and lignum vitae heads, being the most complete line offered by any manufacturer in the country, and which for simplicity of construction and effectiveness have no equal. Catalogues and price lists furnished upon application at office and salesrooms.

No. 102 Chambers Street, NEW YORK.

JOHN ADT,

30, 32, 34 and 36 Artisan Street, New Haven, Conn., U. S. A.

Automatic Machines for Straightening and Cutting Wire of all sizes to any length.
Automatic Machines for Cutting and Forming Wire in various shapes.

HARDWARE MANUFACTURERS' TOOLS.

Send for circulars.

NATIONAL Horse Nail Co.

MANUFACTURERS OF

FINISHED

(BRIGHT OR BLUED)



These nails are made of the best brands of NORWAY IRON, and are guaranteed to be equal to any in the market.

NATIONAL HORSE NAIL CO.,
VERGENNES, VT.
HORACE DURRIE & CO., Agents,
No. 97 Chambers St., New York

ANVIL NAIL CO.

We desire to call the attention of the trade to our new manufacture of

Steel Horse Shoe Nails,

made from metal prepared in the Martin-Siemens Furnace by our PATENT process, which produces a nail having all the requisites for a

PERFECT HORSE SHOE NAIL.

The well-known desirable properties of a perfect nail are, that the POINT should be sharp, the SHANK stiff, to drive without crippling under the hammer, sort enough to clinch readily, while sufficiently tough to avoid all danger from the "drawing the clinch" or breaking the neck under the head. These properties we claim for the

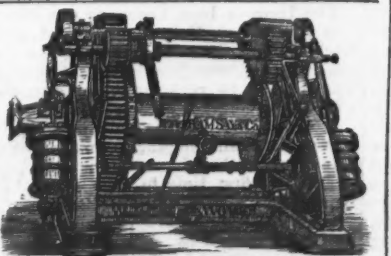
"ANVIL HORSE NAILS."

In the process of manufacture the metal is compressed under the head, which gives the nail great strength where it is required (between the shoe and hoof), and the cold rolling gives it a stiffness attained in no other way, while the quality of the metal used insures a clinch and point unsurpassed by any nail ever offered in the market. Samples and prices sent on application.

ANVIL NAIL CO.,
65, 67 and 69 Washington St., New York.

A. F. PIKE,
East Haverhill, - New Hampshire,
Manufacturer and Wholesale Dealer in
Scythe, Axe, Knife and Hacke
STONES.

Factories at Haverhill and East Haverhill, N. H., and
Evanville and Westmore, Vt.
Genuine OLD RELIABLE,
INDIAN POND (Red Ends),
LETOILE,
DIAMOND GRIT,
UNION,
WHITE MOUNTAIN,
PREMIUM,
GREEN MOUNTAIN,
GRINDING MACHINE,
RAGG.
Stones gotten up and labeled in
any style desired.
PRICE AND QUALITY GUARANTEED.
All the above Stones are of good
keen grit and will not glaze.



The "Ramsay Improved Steam Winder,"
Manufactured by H. A. RAMSAY & CO.,
Vulcan Iron Works, Baltimore, Md.

Manufactured by
STEAM Crane Bros.
PUMPS Mfg. Co.,
CHICAGO.

Established in 1839.

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L. COES & CO.

Manufacturers of L. Coes'

GENUINE IMPROVED

AND MECHANICS

Wide Bar Full Length.

Wide Bar Full Length.

Patent Screw Wrenches

UNDER PATENTS DATED

JUNE 26, 1866,
MARCH 23, 1869,
REISSUED 1870.

NOVEMBER 10, 1863,
FEBRUARY 23, 1864,
REISSUED JUNE 1, 1869,
IMPROVED AUG. 1, 1877.

The back thrust when in use borne by the SHANK instead of the Hand's.
None genuine unless stamped "L. COES & CO."

WORCESTER, MASS.

Warehouse, 97 Chambers St., & 81 Reade St., N. Y.
HORACE DURRIE & CO., Sole Agents.



These Axes Made from

HORACE DURRIE & CO.,
New York.



Firth's Best English Cast Steel.

The 1879 Pennsylvania Lawn Mower.

LIGHT DRAFT AND EASILY ADJUSTED.

Every Machine Warranted to Work as Represented.



Points Claimed as being Meritorious:

1. Lightness, combined with Strength in Construction.
2. Ease of Adjustment.
3. Ease in Securing and Adjusting the Handle.
4. The Least Liability to Obstruction from Clodding, either in short or (for a Lawn Mower) high Grass.
5. Lightness or Ease of Running while being worked.
6. The Attractive Appearance of the Machine.

It is the lightest machine in use, and all that is necessary to satisfy our customers of its superiority is to place it in competition with any other machine in the town in which they may reside.

PRICE LIST.

Width of Cutter.	Style.	Driving Wheels.	Power required.	Weight.	Price.
10 inch.	2 inch.	A Child.	3 1/2 lbs.	14.00	
12 "	4 "	A Lad.	3 1/2 "	18.00	
14 "	6 "	A Lad.	3 1/2 "	20.00	
16 "	8 "	One Man Size.	3 1/2 "	22.00	
18 "	8 "	"	4 "	24.00	

NEW MACHINES.

15 inch, 10 1/2 inch Driving Wheels, 6 1/2 inch Cylinder, Man Size, 45 lbs.	\$22.00
17 inch, 10 1/2 inch Driving Wheels, 6 1/2 inch Cylinder, Man Size, 51 lbs.	24.00

GENERAL AGENTS:

LLOYD, SUPPLEE & WALTON, 625 Market Street, Philadelphia.
HORACE DURRIE & CO., 97 Chambers and 81 Reade Streets, N. Y.

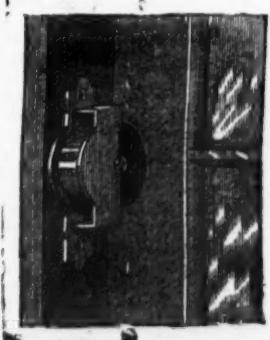
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Anti-Window

RATTLER,

FOR

Dwellings, Cars, Steamboats, &c.



The Anti-Window Rattler supplies a long needed want; it is so simple in construction that it can be used on any window, and so complete that it will prevent the slightest shaking, no matter how great the jar or how old the sash. As shown in cut, it consists of a rubber wheel in a nickel-plated or brass frame; is ornamental as well as useful, and does not interfere with raising or lowering the sash.

HEATON & DENCKLA, General Agents, 507 Commerce St., Philadelphia.
GRAHAM & HAINES, Agents, 113 Chambers St., New York.
OTIS D. DANA, Agent, 26 to 32 Pearl St., Boston, Mass.

LANE'S MEASURING FAUCET.

Price, \$3.00.

For Light or Heavy Molasses, Oils, Varnishes or other Fluids.

We warrant these Faucets to be as represented, measuring correctly and working more easily in heavy molasses than any measuring Faucet in the market. No grocer can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, requiring no tin measures or funnel to collect dirt and draw flies. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.



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LANE BROTHERS, Millbrook, N. Y.

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INTERNATIONAL EXHIBITION.

PHILADELPHIA, 1876.

(No. 235.)

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz:

Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.

G. L. REED. Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,
Jas. Bain,
Chas. Staples,

G. L. Reed,
J. D. Imboden,

J. Diffenbach,
Dav. McHardy

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.
Given by authority of the United States Centennial Commission.

A. T. GOSHORN, Director-General.

[L.S.] J. L. CAMPBELL, Secretary.

J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

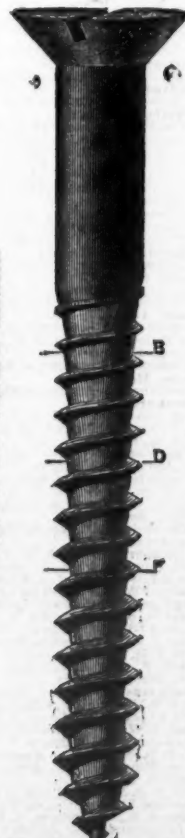
Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all



1846.
Patented August 30.



1876.
Patented May 30.
COVERED BY TRADE MARK.



Section at Line A B

Section at Line C D

Section at Line E F

Section at Line A B

Section at Line C D

Section at Line E F

the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

Estimated to be FIFTY PER CENT. "C" "I"

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Lighter Draft.



We now manufacture three styles of Hand Lawn Mowers, viz., Roller, Side Wheel and Back Wheel, as well as our well-known Horse Lawn Mower, and desire to call them to the special attention of the trade, both domestic and export.

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Our new Horse Mower is conceded to be the lightest and best Horse Lawn Mower ever made.

N. B.—Horse and Hand Lawn Mowers are alike guaranteed in all respects.

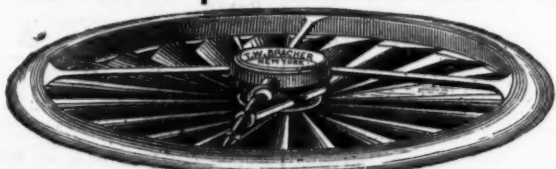


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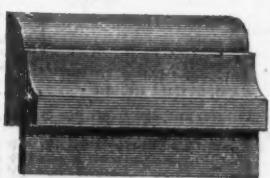
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No. 6.



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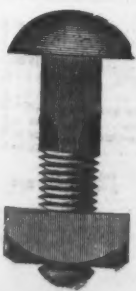
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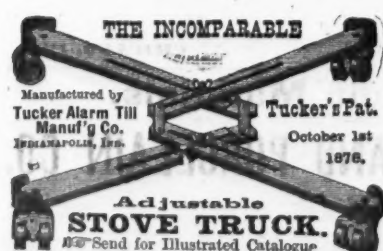
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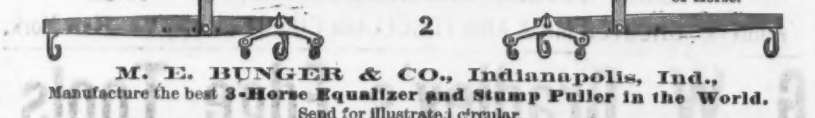
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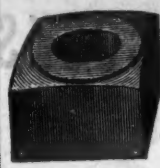
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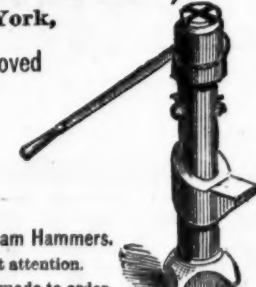
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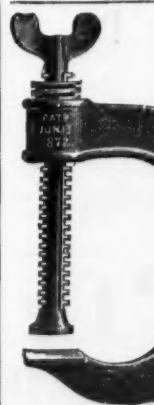
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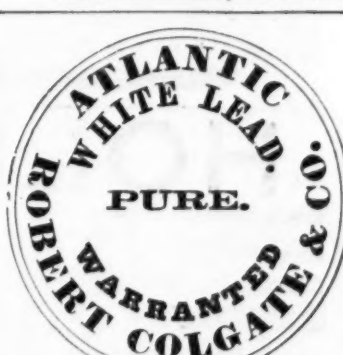


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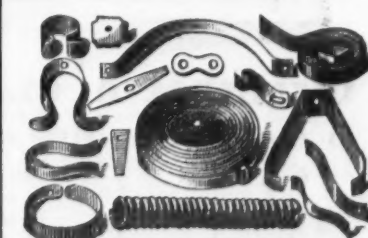
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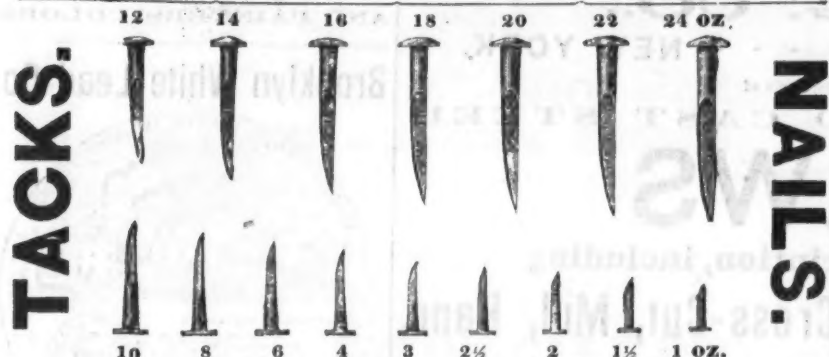
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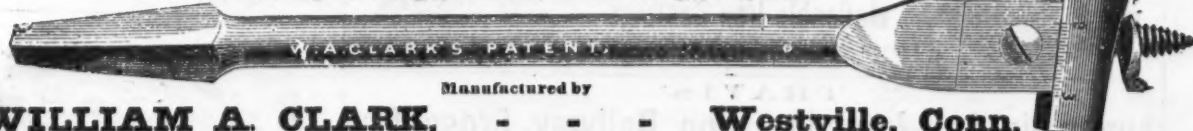
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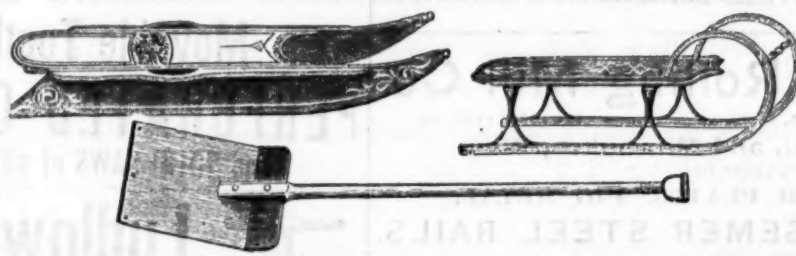
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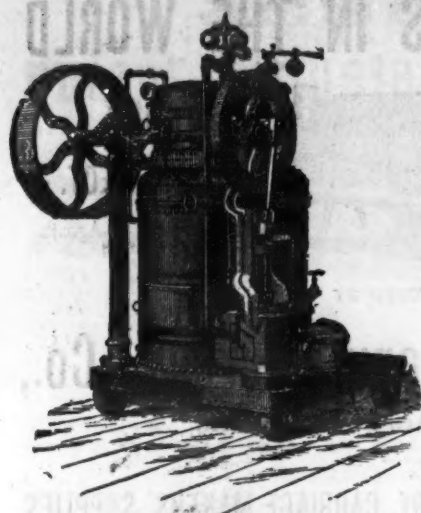
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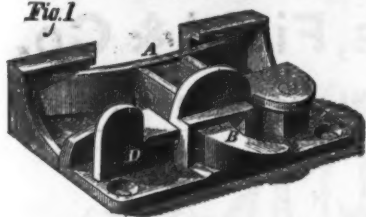
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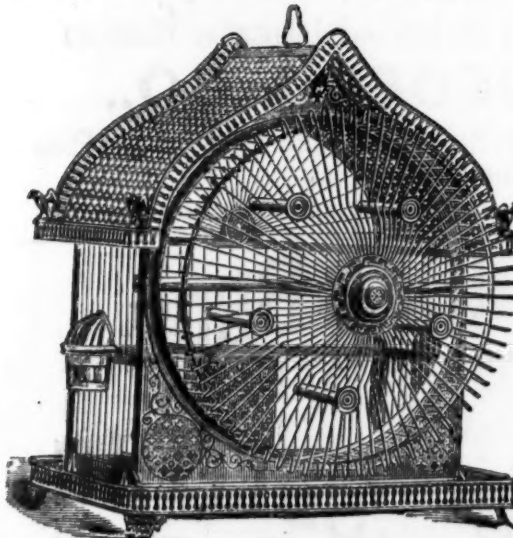
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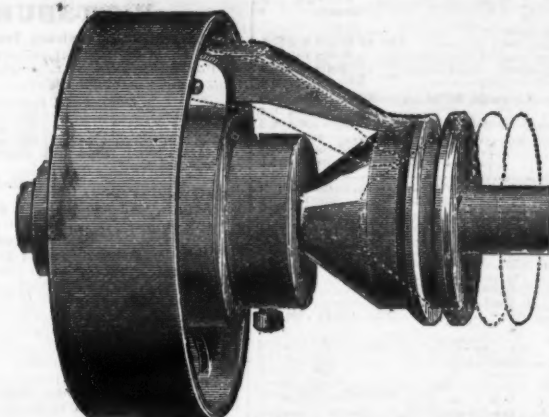
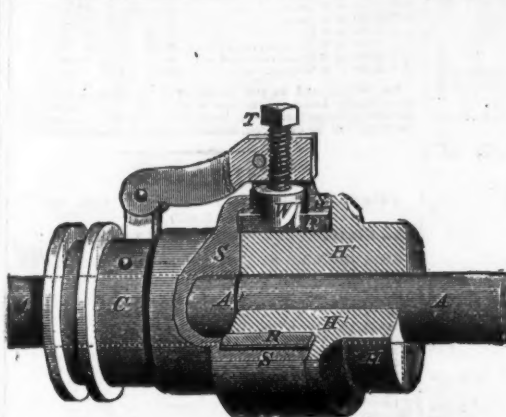
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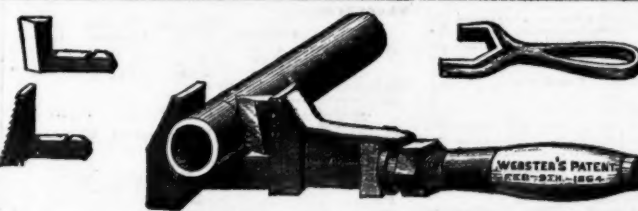
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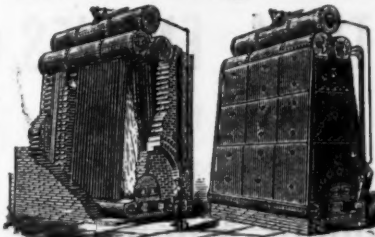
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Superior to Wood Blocks
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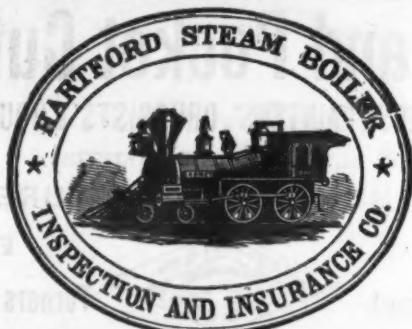
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No Charge for Boxing or Cartage.

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1 1/2	30.00	34.00	3.00	9.00
1 3/4	35.00	40.00	3.50	12.00
2	40.00	46.00	3.75	12.00
2 1/4	45.00	52.00	4.25	14.00
2 1/2	50.00	58.00	4.50	17.00
2 3/4	55.00	64.00	5.00	21.00
3	60.00	70.00	5.50	25.00
3 1/4	65.00	76.00	6.00	31.00
3 1/2	70.00	82.00	6.50	37.00
3 3/4	75.00	88.00	7.00	44.00
4	80.00	94.00	7.50	50.00
4 1/4	85.00	100.00	8.00	56.00
4 1/2	90.00	106.00	8.50	60.00
4 3/4	95.00	112.00	9.00	65.00
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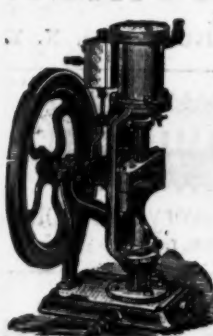
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The Eclipse Steam Pump.

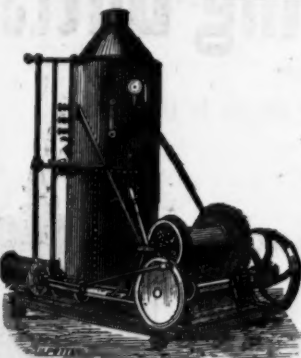
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This differs from any Pump of its class by doing away with a sliding box or strap, and supplying the places of the same by a hardened steel roller and steel pin. By this construction a great amount of friction is avoided. It is durable, handy and cheap. Anyone of ordinary intelligence can successfully operate it. Prices range from \$45 upwards. Send for circular.

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SMITH'S PATENT RATCHET.

IT IS SIMPLE, EFFICIENT, DURABLE.

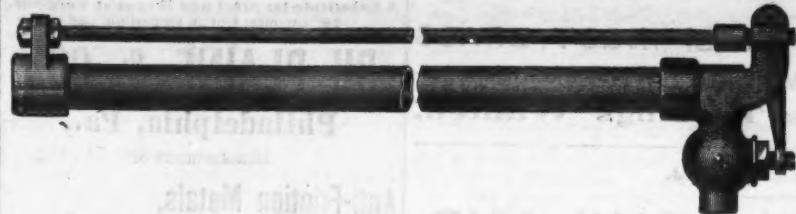
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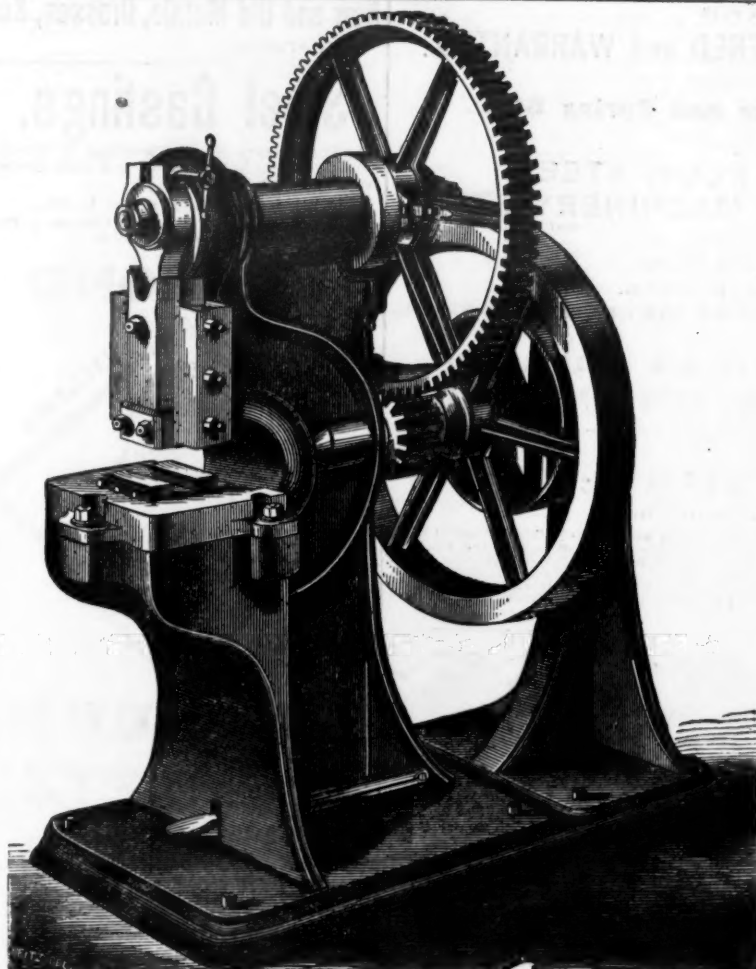


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Suits any Location.

Price, \$12.

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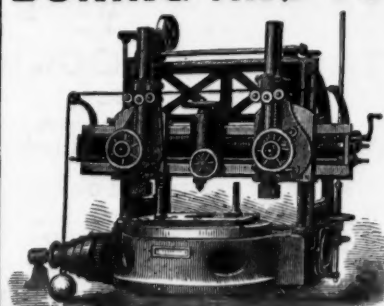
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Special Pulley Turning Machinery, Engine Lathes, Iron Planers, Universal Radial Drilling Machines, Hydrostatic Presses, Car Axle Lathes and Wheel Bore. Latest designs and patterns. Prices very reasonable.

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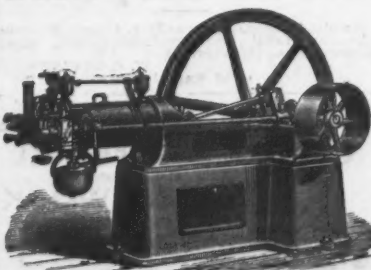


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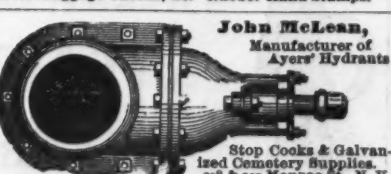
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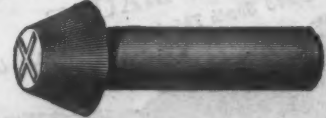
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